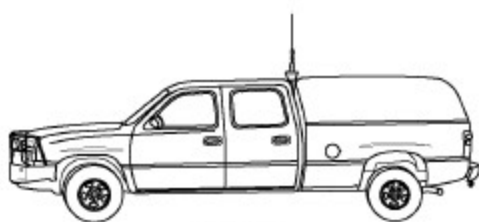
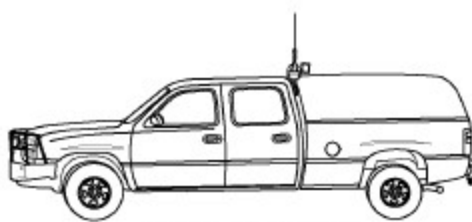


SERVICE MANUAL MILITARY SUPPLEMENT
LIGHT UTILITY VEHICLE WHEELED
(LUVW), 4 x 4, MIL COTS, ALL VARIANTS
(ENGLISH)



BASIC



MILITARY POLICE



CABLE LAYER

Contact Officer: DSVPM 3-5

Preface

Caution

Caution: To reduce the chance of personal injury and/or property damage, carefully observe the instructions that follow:

The service manuals of General Motors Corporation are intended for use by professional, qualified technicians. Attempting repairs or service without the appropriate training, tools, and equipment could cause injury to you or others. This could also damage the vehicle, or cause the vehicle to operate improperly.

Proper vehicle service and repair are important to the safety of the service technician and to the safe, reliable operation of all motor vehicles. If you need to replace a part, use the same part number or an equivalent part. Do not use a replacement part of lesser quality.

The service procedures we recommend and describe in this service manual are effective methods of performing service and repair. Some of the procedures require the use of tools that are designed for specific purposes.

Accordingly, any person who intends to use a replacement part, a service procedure, or a tool that is not recommended by General Motors, must first establish that there is no jeopardy to personal safety or to the safe operation of the vehicle.

This manual contains various “Cautions” and “Notices” that you must observe carefully to reduce the risk of personal injury during service or repair. Improper service or repair may damage the vehicle or render the vehicle unsafe. For Cautions and Notices, refer to Cautions and Notices in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW). These “Cautions” and “Notices” are not exhaustive. General Motors cannot possibly warn of all potentially hazardous consequences of your failure to follow these instructions.

This manual covers service procedures to vehicles that are equipped with a Supplemental Inflatable Restraint (SIR). Refer to the “Cautions” in Cautions and Notices and in Restraints. Refer to SIR component and wiring location views in Restraints before performing a service on or around SIR components or wiring. Failure to follow these “Cautions” could cause air bag deployment, personal injury, or otherwise unneeded SIR repairs.

In order to help avoid accidental air bag deployment and personal injury, whenever you service a vehicle that requires repair of the SIR and another vehicle system, we recommend that you first repair the SIR, then go on to the other system.

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2003 General Motors DND Military Vehicles Service Manual Supplement

This manual provides information on the diagnosis, the service procedures, the adjustments, and the specifications for the 2003 GM Light Utility Vehicle Wheeled (LUVW) Base and Military Police (MP) Crew cab Pickups and Cable Layer (SEV) Extended Cab Pickup.

Information on transmission unit repair (overhaul) can be found in the 2003 Transmission/Transaxle/Transfer Case Unit Repair Manual (TURM), available separately. The TURM contains information on automatic and manual transmissions and transaxles including the fluid flow and circuit description information.

The technicians who understand the material in this manual and in the appropriate Dealer Service Bulletins better service the vehicle owners.

When this manual refers to a brand name, a part number, or a specific tool, you may use an equivalent product in place of the recommended item. All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication approval. General Motors reserves the right to make changes at any time without notice.

Published by
GM DEFENCE MILITARY TRUCKS
General Motors Corporation
Detroit, MI 48265-1000

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Section 0

General Information

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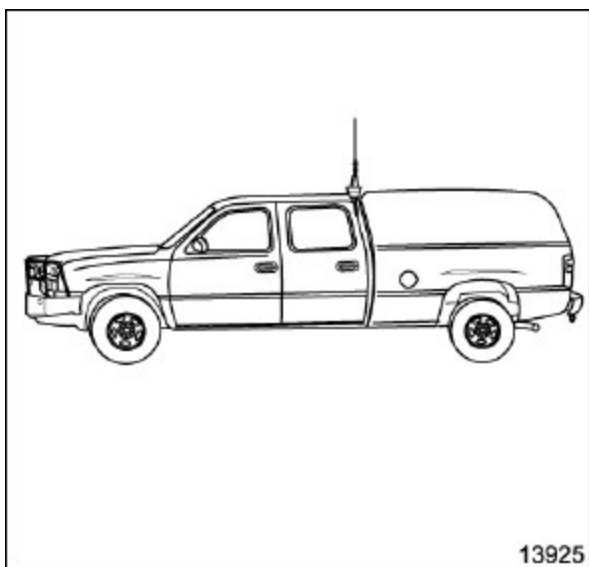
General Information

Vehicle Identification

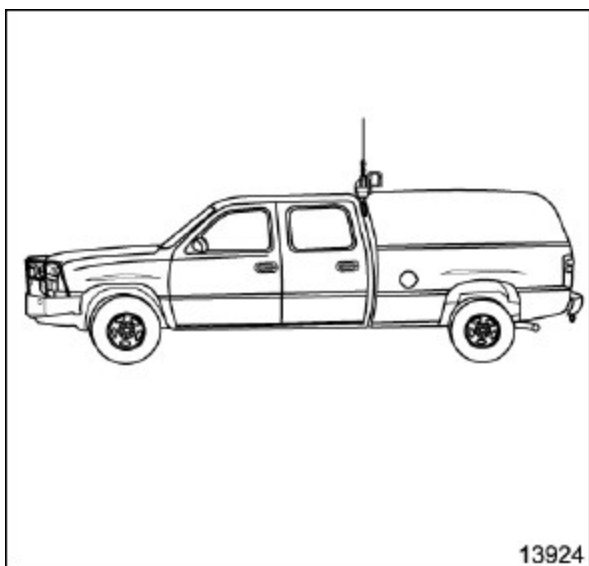
The 2003 LUVW series military vehicle models derive from standard commercial vehicles. The vehicle is a 2500HD 1.0-Ton, or 1.5-ton based cable layer.

All vehicles have rugged designs intended for all types of roads or infrequent off-road travel. They can ford water obstacles for three minutes without stalling at depths of 51 cm (20 in) at 8 kph (5 mph). These limits are met without causing permanent damage or requiring immediate maintenance.

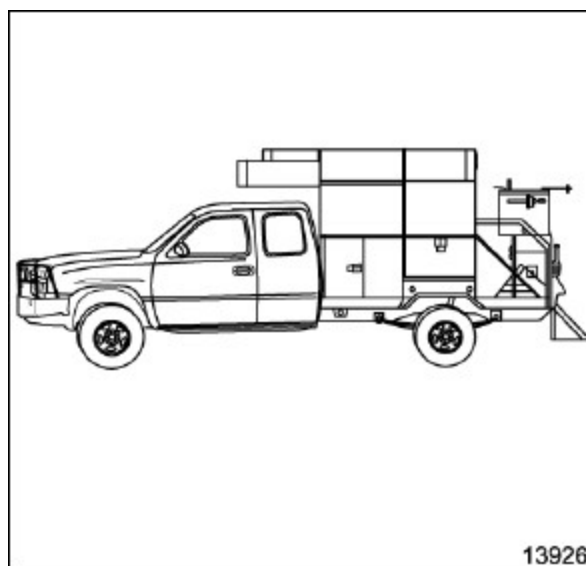
Base Vehicle



Military Police (MP) Vehicle



Cable Layer (SEV) Vehicle



The vehicles are equipped with a 6.6L Turbo diesel engine with a 5-speed Allison automatic transmission and 2-speed transfer case.

Each vehicle is equipped with heavy duty shocks front and rear, 4-wheel anti-lock brakes, a locking differential, on-off road tires, front and rear clevis/tie-downs and blackout lighting.

A slave receptacle is mounted on the front of the vehicles, protected by a radiator brush guard.

The vehicle has a hard cap with opening rear window, all vehicles have cargo mounts on the bed floor. A specially upgraded electrical system can handle 24V communications equipment and charging of the 24V battery.

List of Militarized Components

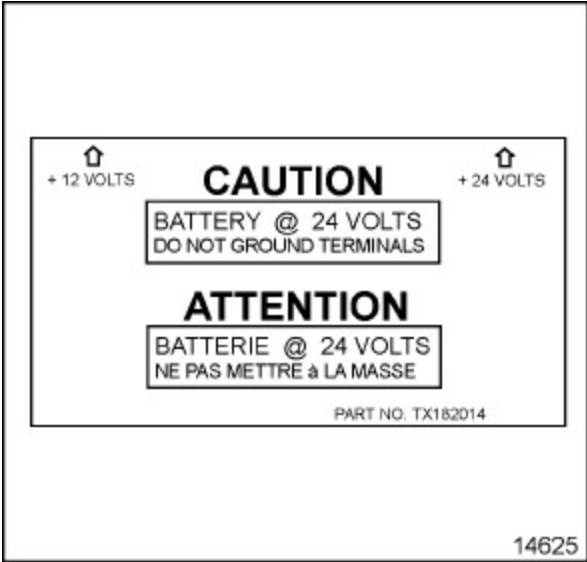
Light Utility Vehicle Wheeled, Basic, MP and Cable Layer (SEV)

Your vehicle may be equipped with any combination of options.

Description
24V Generator
Blackout (B/O) Lighting
NATO Slave Start Receptacle
Heavy Duty Front Bumper with Brush Guard and Clevis/Tie Downs
Heavy Duty Rear Bumper with Clevis/Tie Downs and Receiver Hitch
Sliding Rear Window
Pintle Hook
Trailer Light Connection
Weapons Mount
Transfer Case/Differential Vent Filter
Government Data Plate
Rear Shock Covers
Cargo Tie-Downs
Rear Caliper Covers
Fuel Fired Heater
Cargo Locking Rear Access Topper
Brake Line/Hose Cover
Underbody Protection/Skid Plate
Antenna/Light Bar
MP Package
ABS Component Protection

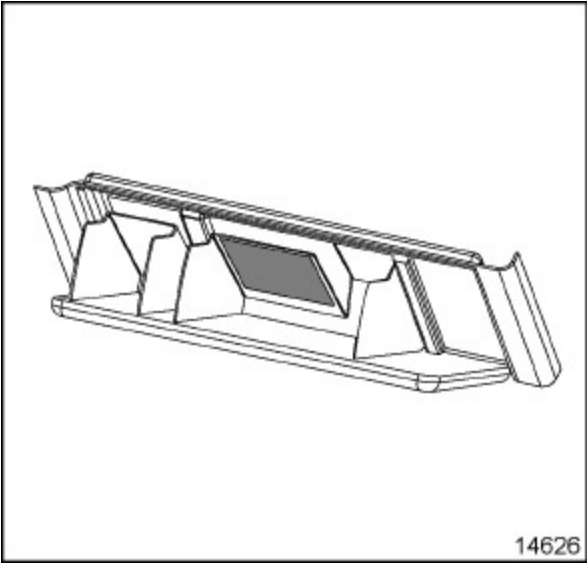
Labels

24V Battery Caution Label



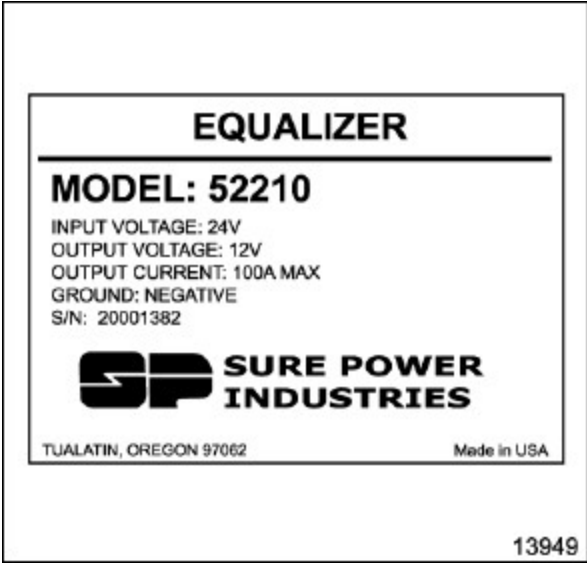
The 24V battery caution label is placed on the radiator support in front of the 24V battery. This battery is on the left side of the engine compartment.

Owner/User's Label



The owner/user's label is located in the glove compartment and has information pertaining to the vehicle's upfitting. Refer to Paint Codes in Paint/Coatings for current exterior paint part numbers.

Equalizer Label



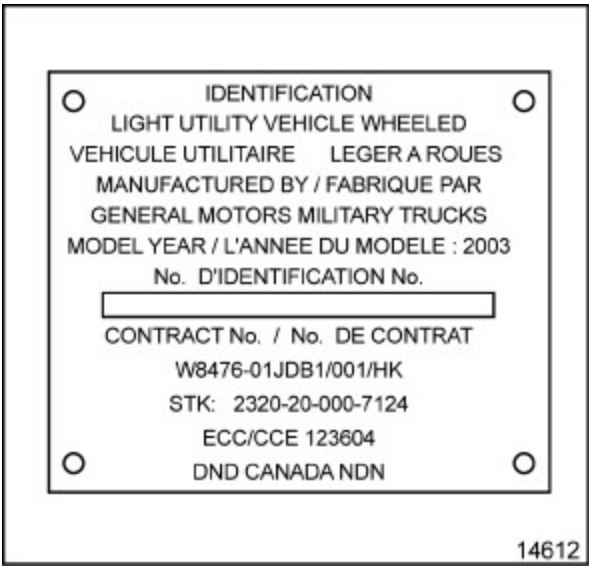
The equalizer label is located on the side of the equalizer. This label includes information on model number, serial number and voltage specifications.

Fuel Fired Coolant Heater Label



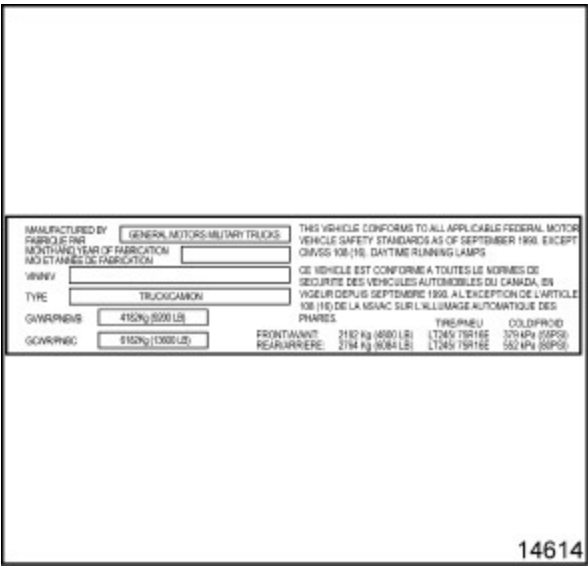
The fuel fired coolant heater is located on the side of the unit. This label includes information on model, serial number. Refer to Component Locator in Engine Cooling for further information.

Vehicle Identification Plate



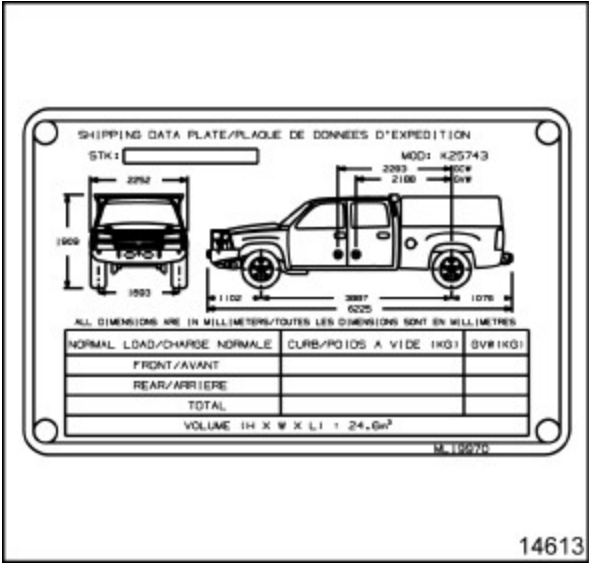
The vehicle identification plate is located on the left front inner door panel under the shipping data plate. This label includes, the identification number, contract number and vehicle variant.

Statement of Compliance Plate



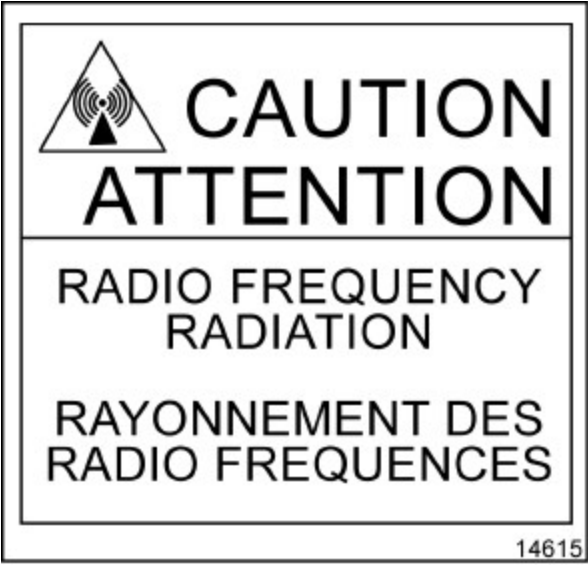
The statement of compliance plate is located on the left front lower middle of the inner door panel. This label includes, the manufacture, date of fabrication, VIN, type vehicle weight and tire pressure.

Shipping Data Plate



The shipping data plate is located on the left front inner door panel above the vehicle identification plate. This label includes the loading and dimensions.

Radio Frequency Caution Plate



The radio frequency caution plate is located on the inside front windshield above the rear view mirror. This plate warns the occupants of radio frequency radiation.

Maintenance and Lubrication

Maintenance

Owner Checks and Services

If the engine, controls, instruments or gages do not operate as described in this supplement manual, refer to one of the following manuals:

- C-31-Q44-000/MB-001
Operator's Instructions, Light Utility Vehicle Wheeled (LUVW)
- C-31-Q44-000/MN-001
Service Manual, Light Utility Vehicle Wheeled (LUVW)
- C-31-Q44-000/MB-003
Operator's Instructions, Duramax Diesel Engine, Light Utility Vehicle Wheeled (LUVW)
- C-31-Q44-000/MB-005
Operator's Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW)

If the concern still has not been corrected, shut down the engine and notify your military maintenance unit.

Periodic Maintenance Inspection

- Inspect the condition of the headlamps, taillamps, turn signals, side lamps, and blackout lamps, before beginning to operate the vehicle each time.
- Inspect the axle vent tube filter for blockages every six months and more often when difficult off-road conditions are encountered. Replace as needed.
Refer to Front Axle Vent Tube Filter Replacement in Front Drive Axle or Rear Axle Vent Tube Filter Replacement in Rear Drive Axle.
- Inspect the transfer case vent tube filter for blockages every six months and more often when difficult off-road conditions are encountered. Replace as needed.
Refer to Transfer Case Vent Tube Filter Replacement in Transfer Case.
- Refer to Maintenance Schedule in Owner's Manual for other items of maintenance.

Section 3

Suspension

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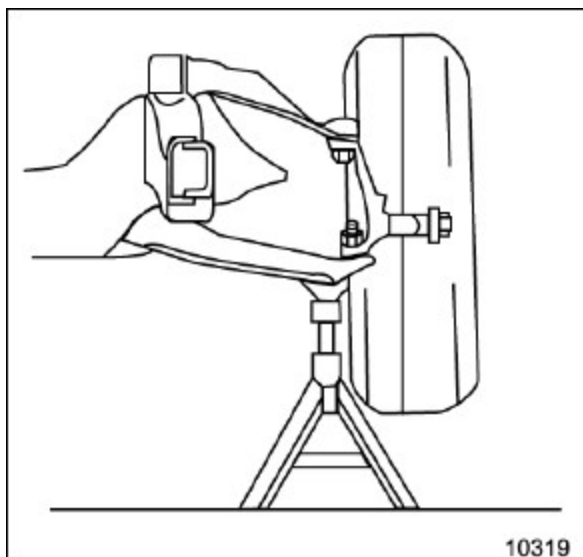
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Front Suspension

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Shock Absorber Bolt	80 N•m	59 lb ft
Shock Absorber Tennon Nut	20 N•m	15 lb ft



Repair Instructions

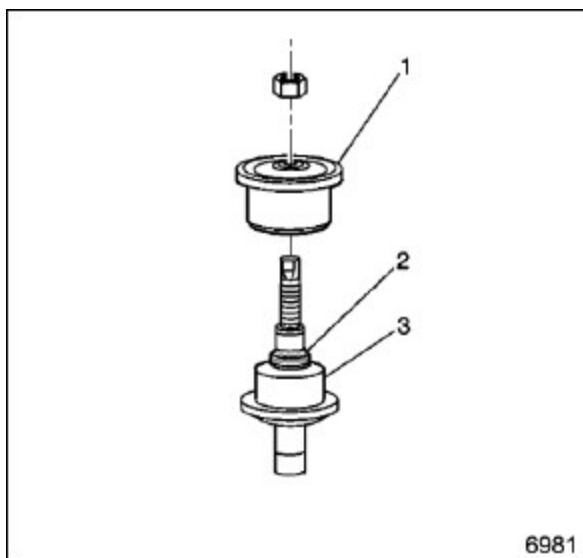
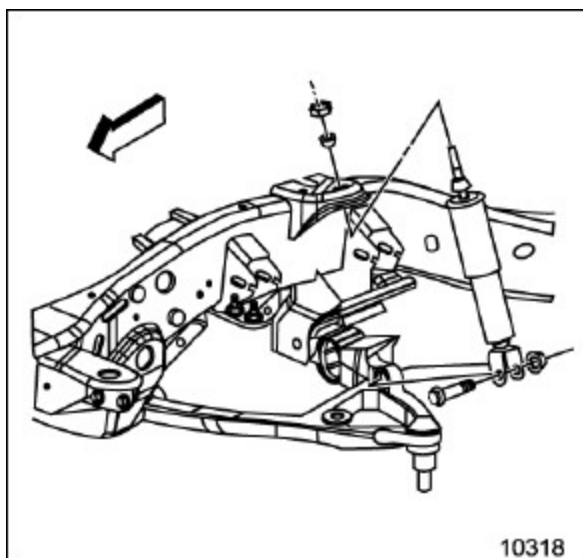
Shock Absorber Replacement

Removal Procedure

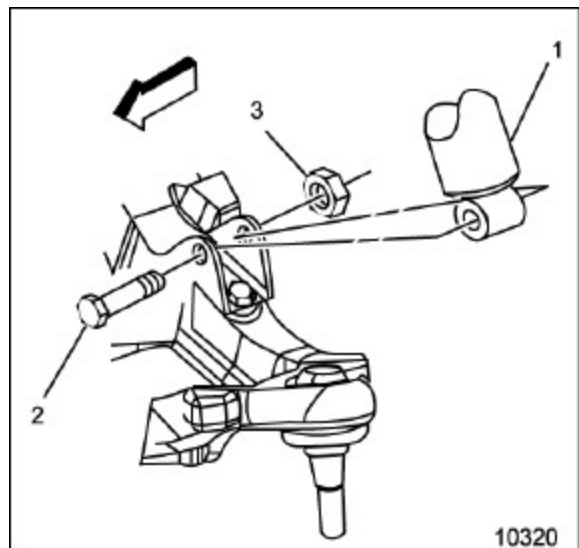
Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

Notice: The front shock absorbers of the vehicle are multifunctional. In addition to contributing to a smooth ride they also provide the only stop to the front suspension when fully extended. Therefore, when servicing the shock absorber, service replacement shock absorbers must be equivalent to original shock absorbers in both extended length and strength. Use of shocks not complying to original equipment or strength could result in suspension over-travel or shock breakage. Suspension over-travel may result in suspension component breakage.

1. Raise and support the vehicle.
2. Support the lower control arm with a jack stand.
3. Hold the tennon end with a wrench while removing the nut.
4. Remove the nut.
5. Remove the upper insulator (1).

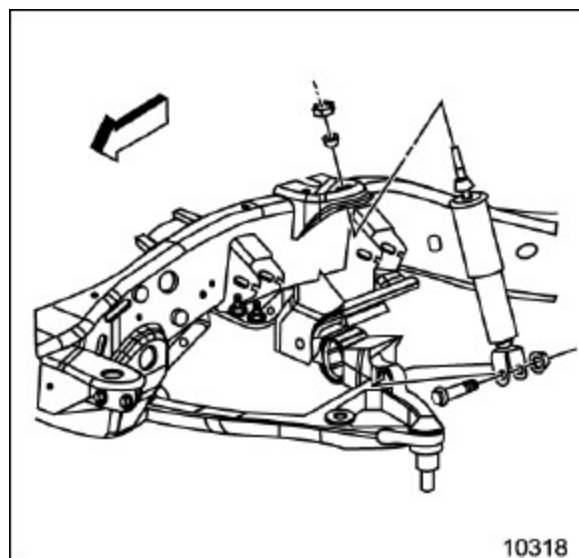


6. Remove the shock absorber mounting bolt (2) and nut (3) at the lower control arm.
7. Remove the shock absorber (1).



Installation Procedure

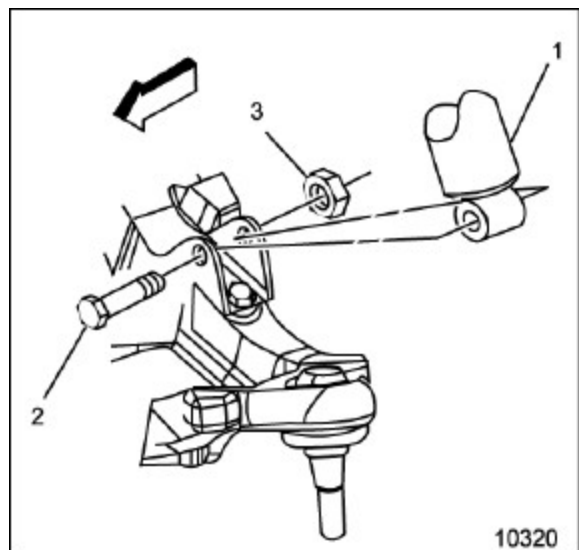
1. Install the shock absorber. Insert the stem through the hole in the shock bracket on the frame.
2. Align the shock absorber with the mounting holes in the lower control arm.



3. Install the shock absorber through bolt (2) to the lower control arm and shock.

Notice: Refer to Fastener Notice in Cautions and Notices.

4. Install the shock absorber through bolt nut (3).
Tighten
Tighten the nut to 80 N•m (59 lb ft).
5. Install the upper insulator to the shock absorber.
6. Install the nut to the tennon end. Hand-tighten only.
7. Remove the safety stands.
8. Lower the vehicle.
9. Hold the tennon end with a wrench while torquing the nut.
Tighten
Tighten the nut to 20 N•m (15 lb ft).



Description and Operation

Front Shock Absorber Description

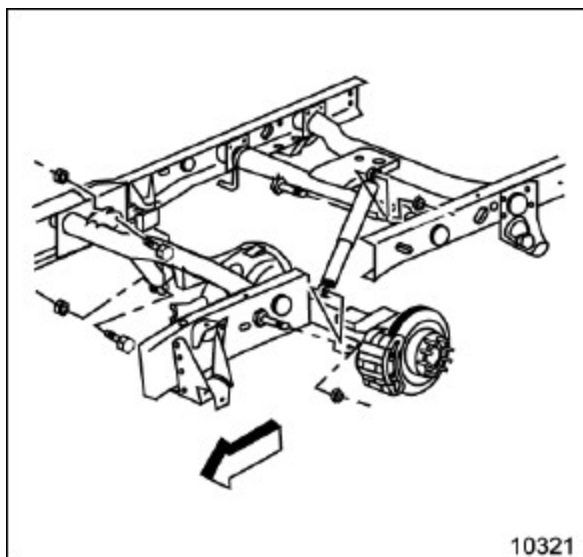
The suspension features a heavy duty shock absorber package necessary for off-road conditions. The replacement procedure is very similar to the procedure for the standard truck.

Rear Suspension

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Shock Absorber Cover Bolts	35-40 N•m	26-30 lb ft
Shock Absorber Nuts	95 N•m	70 lb ft



Repair Instructions

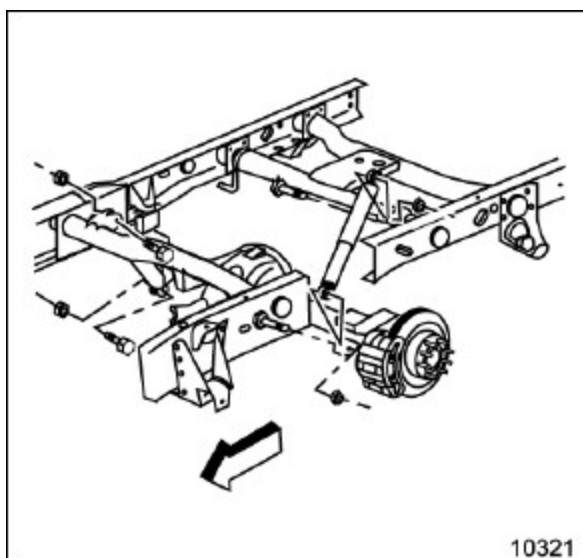
Shock Absorber Replacement

Removal Procedure

Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

Notice: Original equipment shock absorbers serve additionally as suspension drop cutoffs. Replacement shock absorbers must have a built in suspension cutoff feature and must not be longer than original shocks when they are fully extended or serious vehicle or component damage could result.

1. Raise and support the vehicle.
2. Remove the upper shock absorber nut and bolt.
3. Remove the lower shock absorber nut and bolt.
4. Remove the shock absorber.



Installation Procedure

1. Install the shock absorber.
2. Install the upper shock absorber nut and bolt.

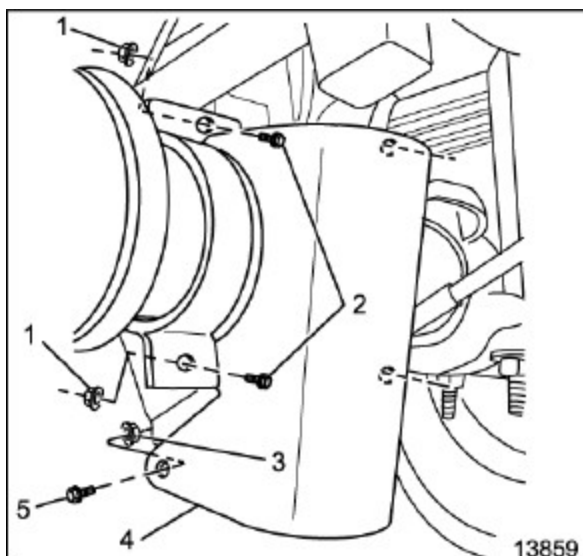
Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the lower shock absorber nut and bolt.

Tighten

Tighten the upper and lower nuts to 95 N•m (70 lb ft).

4. Remove the safety stands.
5. Lower the vehicle.



Shock Absorber Cover Replacement

Removal Procedure

Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

1. Raise and support the vehicle.
2. Remove the 4 bolts (2) and the 4 nuts (1) from the shock absorber cover (4).
3. Remove the lower shock absorber nut (3) and the bolt (5).
4. Remove the shock absorber cover (4).

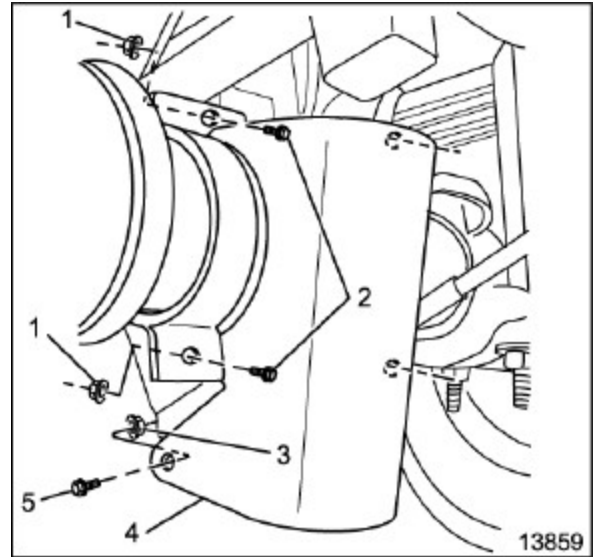
Installation Procedure

Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

1. Install the shock absorber cover (4).

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the lower shock absorber nut and bolt.
Tighten
Tighten the lower nut to 95 N•m (70 lb ft).
3. Install the 4 bolts (2) and the 4 nuts (1) onto the shock absorber cover (4).
Tighten
Tighten the shock absorber cover bolts to 35-40 N•m (26-30 lb ft).
4. Remove the safety stands.
5. Lower the vehicle.



Description and Operation

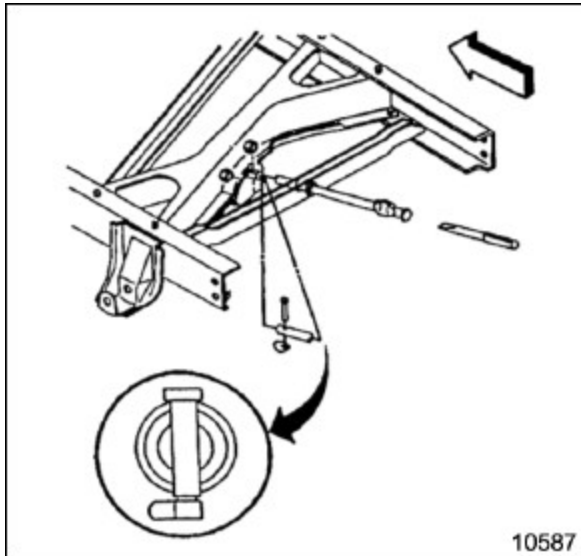
Rear Shock Absorber Description

The suspension features a heavy duty shock absorber package necessary for off-road conditions. The replacement procedure is very similar to the procedure for the standard truck.

Rear Shock Absorber Cover Description

The suspension may also feature a shock absorber cover. The shock absorber cover provides additional protection to the suspension under severe duty usage.

Tires and Wheels

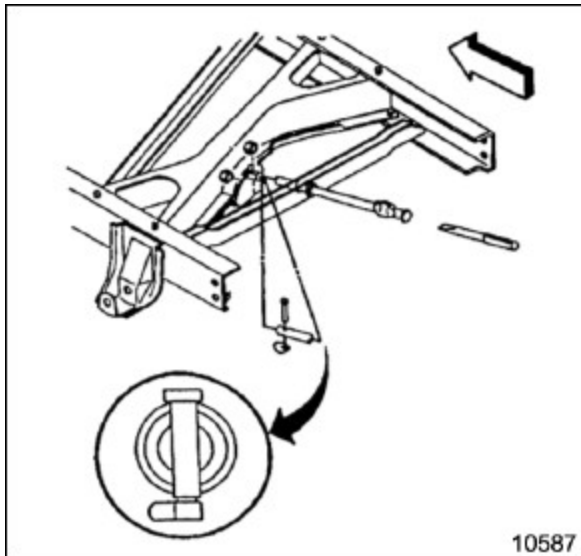


Repair Instructions

Tire Hoist Shaft Extension Replacement

Removal Procedure

1. Remove the spare tire. Refer to Changing a Flat Tire in the C-31-Q44-000/MB-001 Operator's Instructions Light Utility Vehicle Wheeled (LUVW) Manual.
2. Pull the retainer clip and remove the pin.
3. Remove the bar.



Installation Procedure

1. Install the new bar and align.
2. Install the retainer clip and pin.
3. Install the spare tire. Refer to Changing a Flat Tire in the C-31-Q44-000/MB-001 Operator's Instructions Light Utility Vehicle Wheeled (LUVW) Manual.

Description and Operation

Tires and Wheels

Spare Wheel Hoist Shaft

The spare tire is mounted under the rear end of the Base and MP pickups.

The hoist shaft allows a link between the tire hoist and the military rear bumper. The factory spare tire hoist tools are used to remove the spare. A hole in the rear of the bumper is provided to allow access. If the tire hoist is damaged it must be replaced.

Refer to Tire Hoist and Shaft Replacement in Tires and Wheels in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

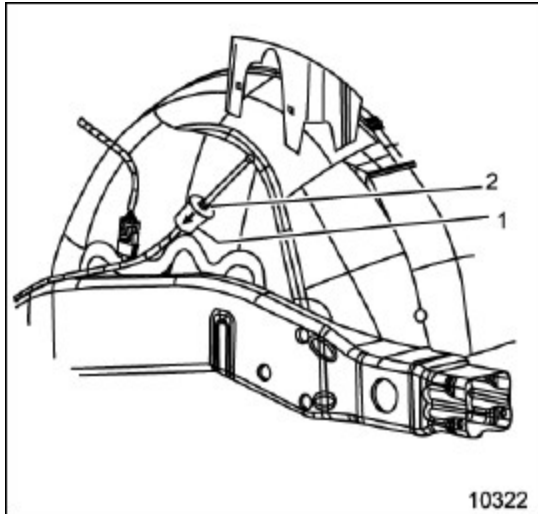
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Driveline/Axle

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Front Drive Axle

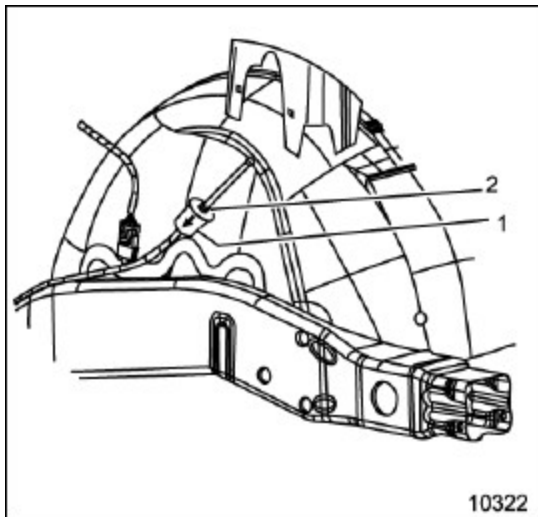


Repair Instructions

Front Axle Vent Tube Filter Replacement

Removal Procedure

1. Remove the clamps (2) holding the filter (1) to the hoses.
2. Remove the filter from the hoses and discard.



Installation Procedure

Notice: The filter arrow must point toward the axle vent pipe. If replacing the hose, the length of the new hose must match the length of the old hose.

1. Install the filter (1) to the hoses.
2. Install the hose clamps (2) and tighten.

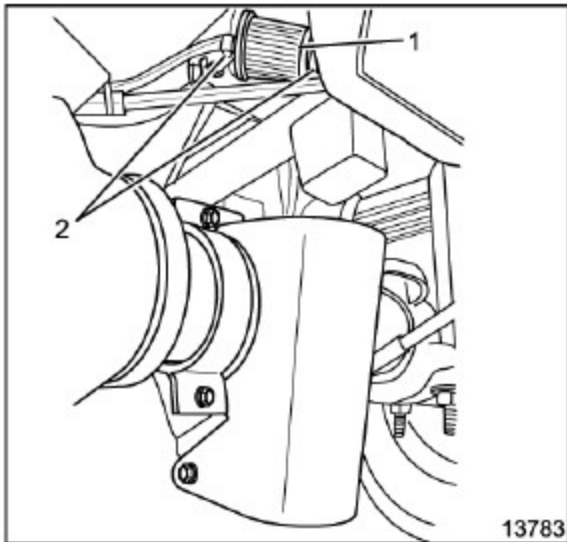
Description and Operation

Front Axle Vent Tube Filter Description

The front axle is specially equipped with a vent tube filter to protect the axle from contaminants found in the off-road environment. The vent filter is attached to a hose with a vented cap at the end, and is mounted in the engine compartment next to the left inner wheel housing.

The filter must be inspected occasionally to see if it needs to be replaced. Refer to Periodic Maintenance Inspections in Maintenance and Lubrication in C-31-Q44-000/MB-005 Operator's Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW).

Rear Drive Axle

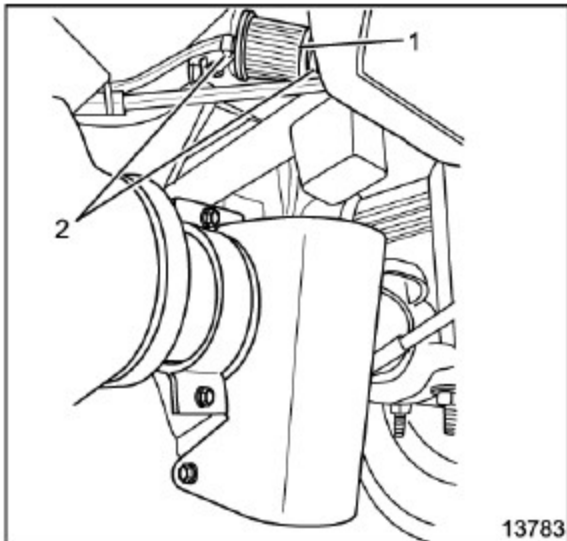


Repair Instructions

Rear Axle Vent Tube Filter Replacement Removal Procedure

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Remove the clamps (2) holding the filter (1) to the hoses.
3. Remove the filter and discard.



Installation Procedure

Notice: The filter arrow must point toward the axle vent pipe. If replacing the hose, the length of the new hose must match the length of the old hose.

1. Install the filter (1) to the hoses.
2. Install hose clamps (2) and tighten.
3. Remove safety stands.
4. Lower the vehicle.

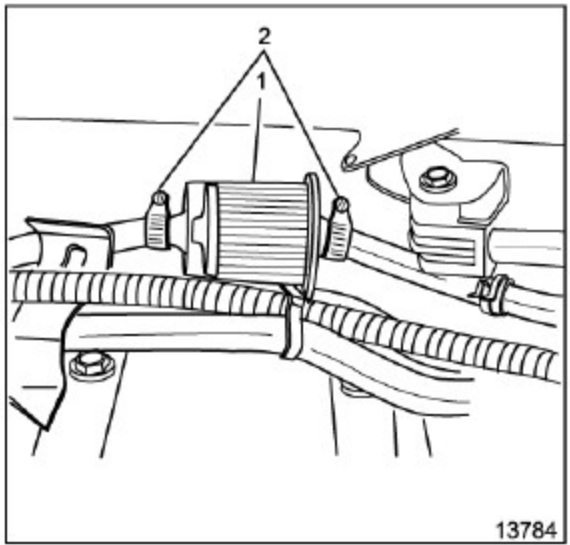
Description and Operation

Rear Axle Vent Tube Filter Description

The rear axle is specially equipped with a vent tube filter to protect the axle from contaminants found in the off-road environment. It is attached to a hose with a vented cap at the end. The rear axle vent filter is mounted near the top of the axle housing and the hose is attached to the brake bracket on the driver's side frame rail.

The filter must be inspected occasionally to see if it needs to be replaced. Refer to Periodic Maintenance Inspections in Maintenance and Lubrication in C-31-Q44-000/MB-005 Operator's Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW).

Transfer Case



Repair Instructions

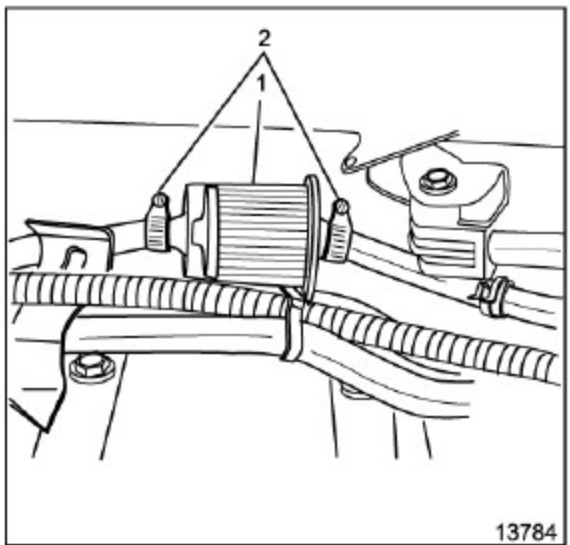
Transfer Case Vent Tube Filter Replacement

Removal Procedure

Note: The filter is located on the left side of the vehicle.

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Remove the clamps (2) holding the filter (1) to the hoses.
3. Remove the filter and discard.



Installation Procedure

Notice: The filter arrow must point toward the transfer case. If replacing the hose, the length of the new hose must match the length of the old hose.

1. Install the filter (1) to the hoses.
2. Install hose clamps (2) and tighten.
3. Remove safety stands.
4. Lower the vehicle.

Description and Operation

Transfer Case Vent Tube Filter Description

Each of the vehicles feature a two-speed transfer case. A vent tube is mounted between the transmission and transfer case, which attaches to a hose, filter and vent cap. The filter must be inspected occasionally to see if it needs to be replaced. Refer to Periodic Maintenance Inspections in Maintenance and Lubrication in C-31-Q44-000/MB-005 Operator's Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW).

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BLANK

Engine Cooling

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Air Cleaner Bracket Bolts	9 N•m	80 lb in
Fuel Fired Heater Mounting Bolts	10 N•m	88 lb in
Fuel Line Clamps	1.4 N•m	12 lb in
Fuel Pump Bracket Bolts	10 N•m	88 lb in
Stand Pipe Nut	9.5 N•m	84 lb in

Fuel Fired Heater Specifications

Where no threshold values are specified technical data in the table are understood to include standard tolerances for heater units of $\pm 10\%$ at an ambient temperature of 20 °C.

All electrical components are selected for a operating voltage of 22-30 volts.

Fuel Fired Heater Specifications

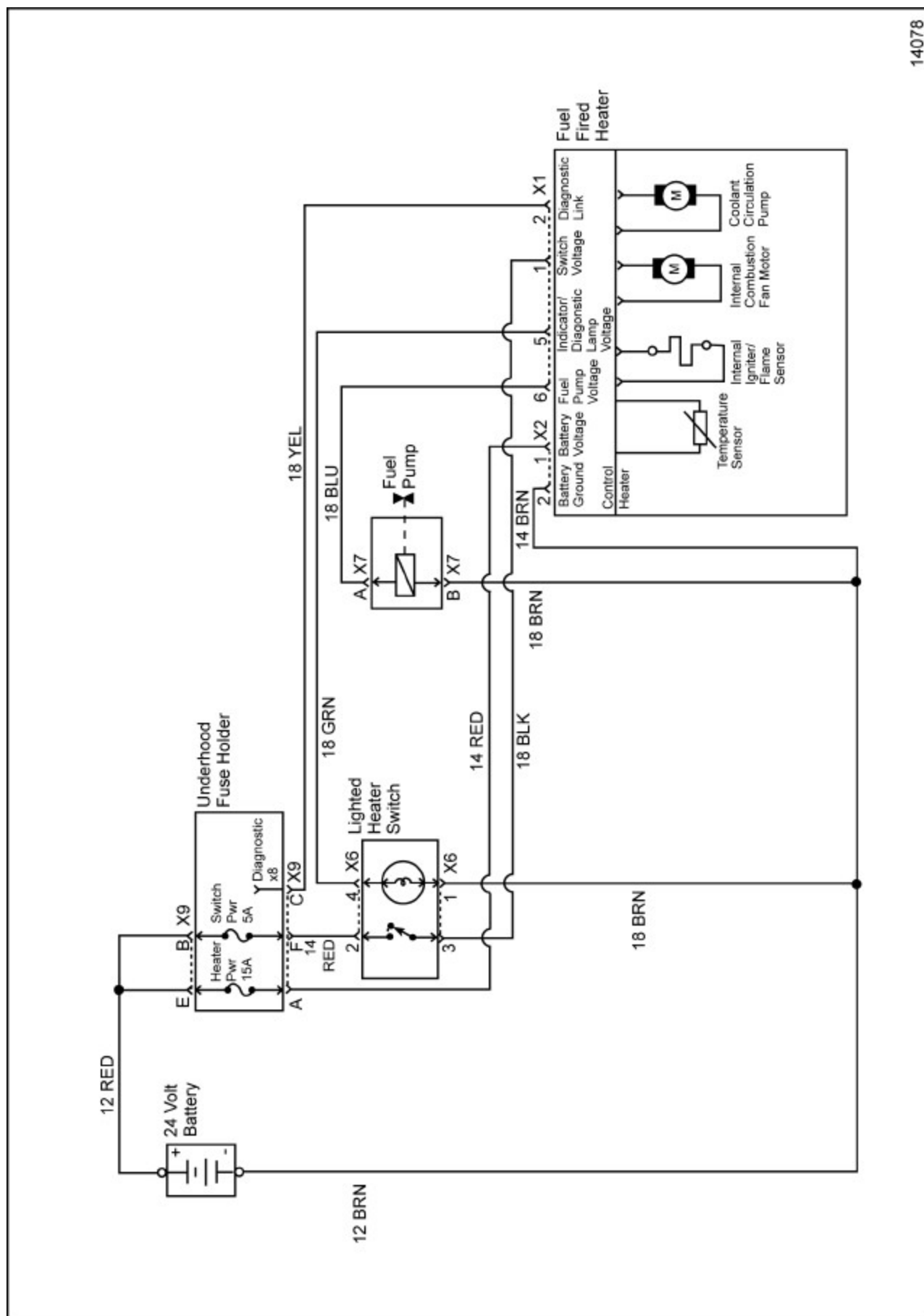
Heater	Operation	Thermo Top 50
Mark of conformity		~S289
Type		Water heater with evaporator burner
Heating Flow	Full load Part load	5.0 kW 2.5 kW
Fuel		Diesel # 1, Diesel # 2, Artic Blends, Kerosene (JP5) and JP8)
Fuel consumption	Full load Part load	0.50 kg/h 0.25 kg/h
Nominal voltage		24 V
Operating voltage range		22-30 Volts
Nominal power consumption without circulation pump (without vehicle air fan)	Full load Part load	32 W 18 W
Permissible ambient temperature: Heater - operation - storage Fuel pump - operation		-40 °C...+60 °C -40 °C...+120 °C -40 °C...+20 °C
Permissible operating overpressure (heat carrier)		0.4...2.5 bar
Heat exchanger capacity		0.15 L
Minimum coolant circuit capacity		4.00 L

Fuel Fired Heater Specifications (cont'd)

Heater	Operation	Thermo Top 50
Minimum volume flow for the heater		250 l/h
CO ₂ in exhaust (permissible functional range)		7...13 vol. %
Dimensions of heater		length 214 mm (8.4 in) width 106 mm (4.0 in) height 168 mm (6.6 in)
Weight		2.9 kg (7.8 lb)
Circulation Pump	Operation	Thermo Top 50
Volume flow against 0.14 bar		450 l/h
Nominal voltage		24 V
Operating voltage range		22-30 V
Nominal power consumption		18 W
Dimensions of circulation pump		length 95 mm (3.7 in) width 61 mm (2.4 in) height 61 mm (2.4 in)
Weight		0.3 kg (0.8 lb)
Fuel Pump	Operation	Thermo Top 50
Flow Rate		10.3 ml/m ($\pm 10\%$)
Pressure per Pulse Cycle		3.4 kPa (0.5 psi)
Fuel Line	Operation	Thermo Top 50
Colour		Natural
Diameter		5 \pm 0.100 2 \pm 0.1 ID
SAE Standard		J1639 – J2260 for Monwall Tubing

Schematic and Routing Diagrams

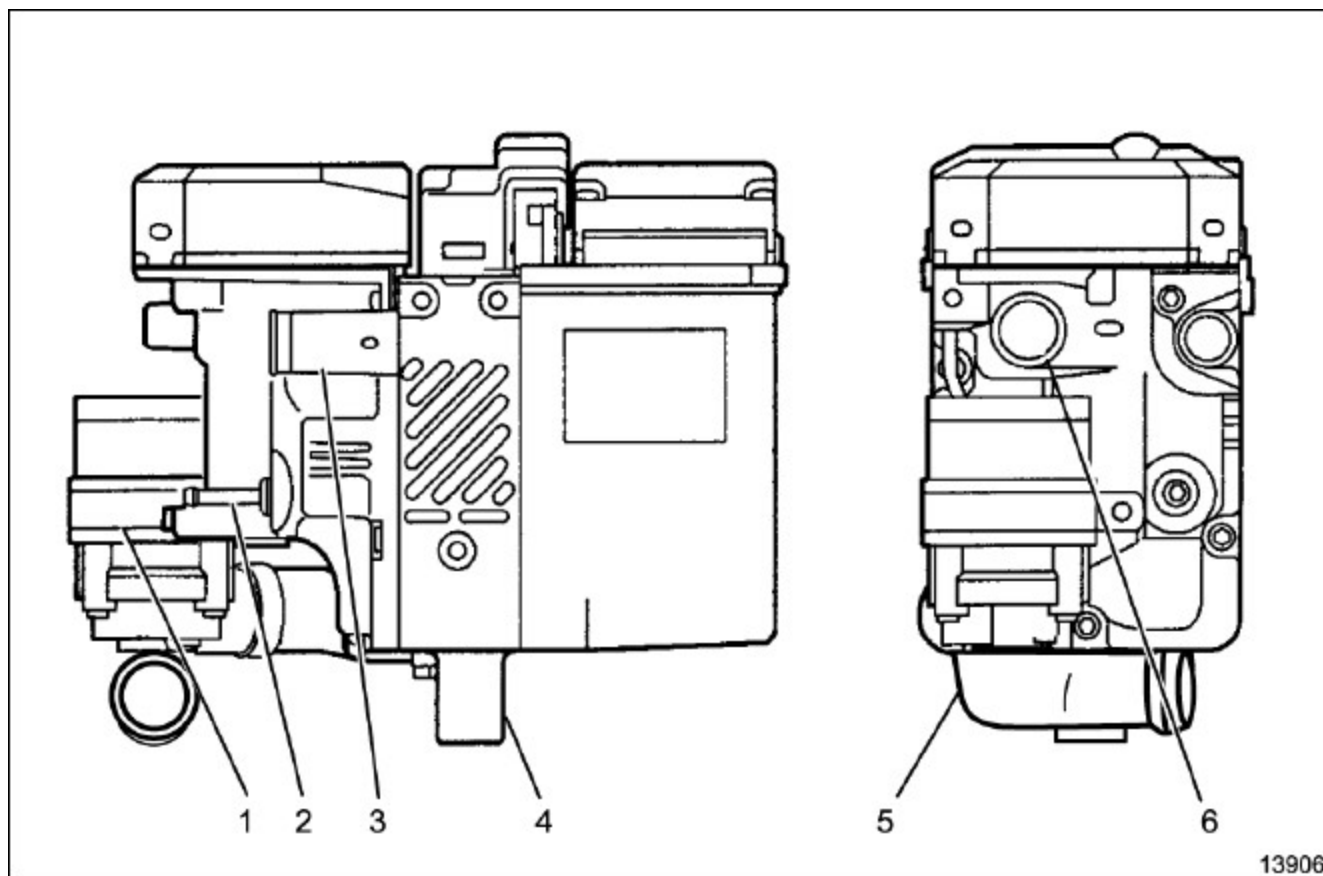
Fuel Fired Heater Schematic



Component Locator

Engine Cooling Component Views

Fuel Fired Heater

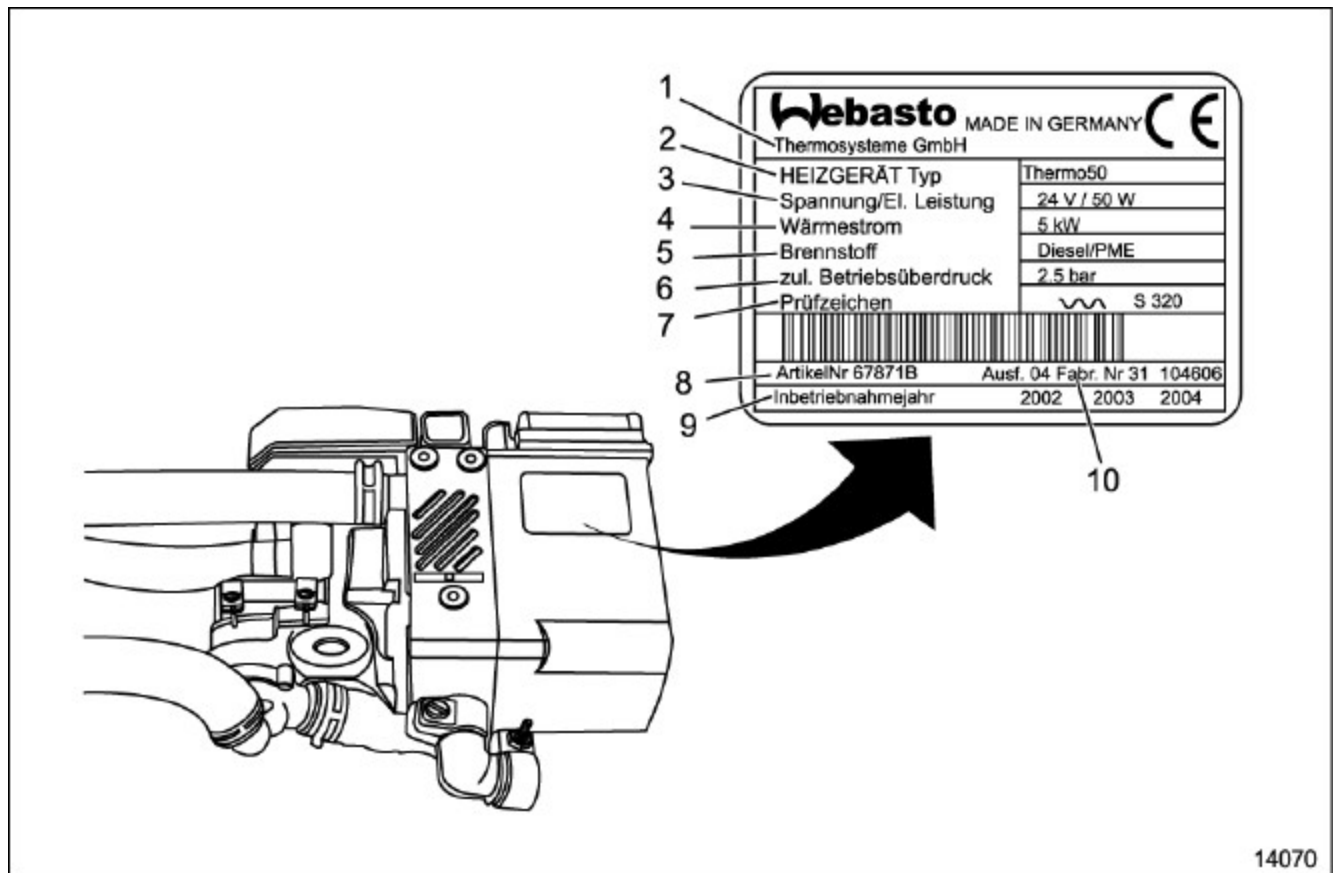


Legend

- (1) Circulating Pump
- (2) Fuel Inlet
- (3) Coolant Outlet

- (4) Exhaust Gas Outlet
- (5) Coolant Inlet
- (6) Combustion Air Inlet

Fuel Fired Heater Label

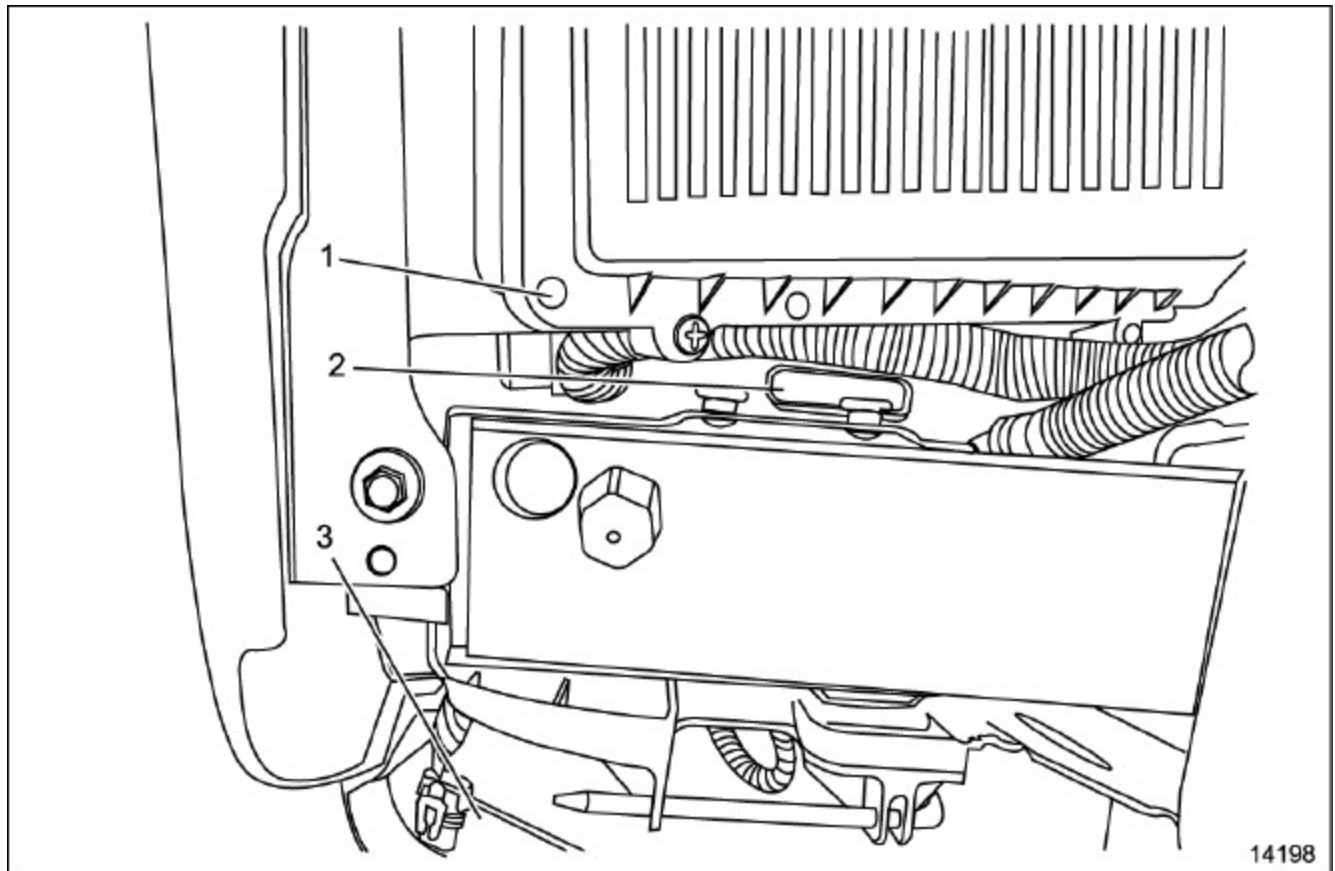


14070

Legend

- | | |
|------------------------------|--------------------------|
| (1) Thermo Systems | (6) Max Coolant Pressure |
| (2) Type of Heater | (7) Conformity |
| (3) Voltage/Electrical Power | (8) Part Number |
| (4) Heat Output | (9) Date of Installation |
| (5) Fuel | (10) Serial Number |

Fuel Fired Heater Fuse Block

**Legend**

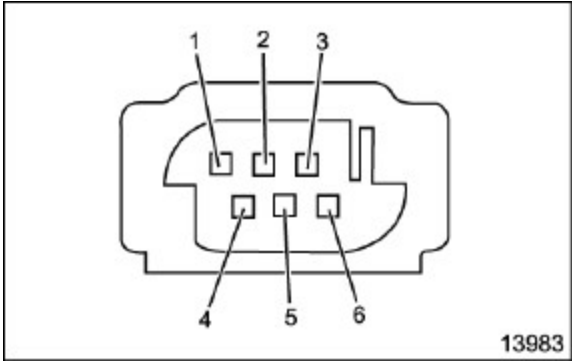
(1) Air Cleaner

(3) Front Headlamp (Right)

(2) Fuel Fired Heater Fuse Block

Engine Cooling Connector End Views

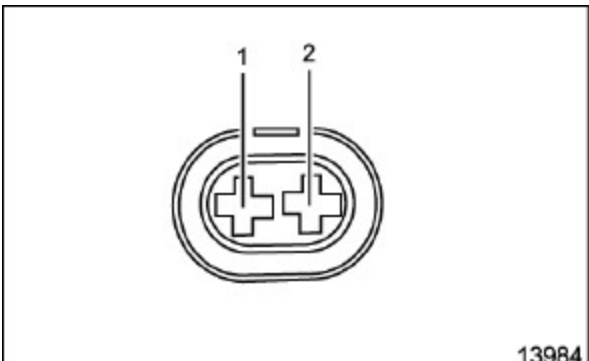
X1 Connector



13983

Connector Part Information		• 6-Way F Connector	
Pin	Wire Colour	Circuit No.	Function
1	BLK	—	Switch Signal
2	YEL	—	Diagnostic Signal
3-4	—	—	Not Used
5	GRN	—	Indicator/Diagnostic Lamp
6	BLU	—	Fuel Pump Positive

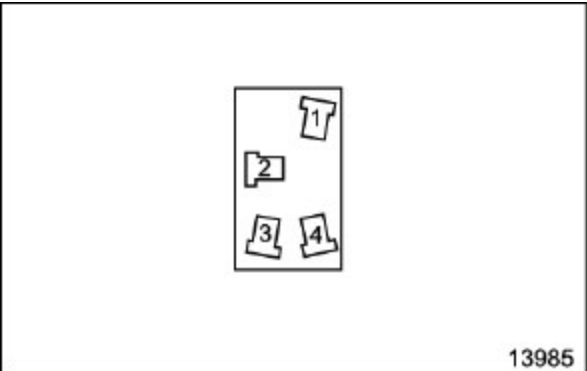
X2 Connector



13984

Connector Part Information		• 2-Way F Connector	
Pin	Wire Colour	Circuit No.	Function
1	RED	—	Battery Fused Power
2	BRN	—	Ground

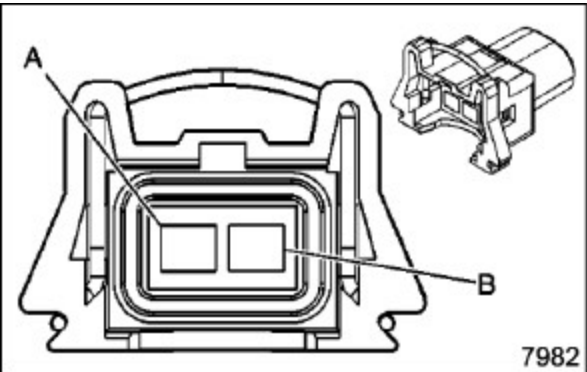
X6 Connector



13985

Connector Part Information		• 4-Way F Connector	
Pin	Wire Colour	Circuit No.	Function
1	BRN	—	Ground
2	RED	—	Fused Power
3	BLK	—	Power to Heater
4	GRN	—	Indicator/Diagnostic Lamp

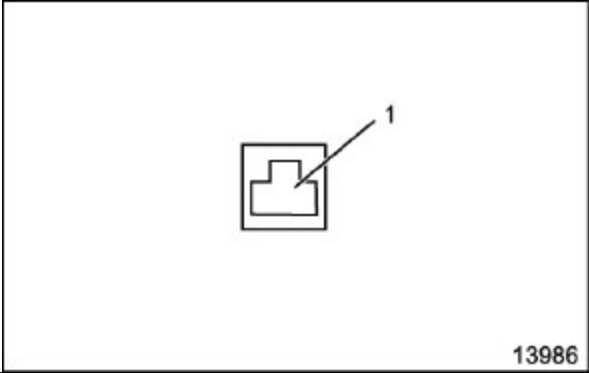
X7 Connector



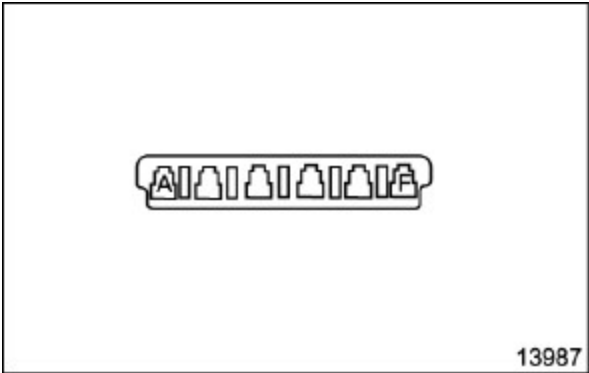
7982

Connector Part Information		• 12110179 • 2-Way F Metri-Pack 280 Series 1 P2S (BK)	
Pin	Wire Colour	Circuit No.	Function
A	BRN	—	Ground
B	BLU	—	Power to Fuel Pump

X8 Connector

			
Connector Part Information		<ul style="list-style-type: none"> • 1-Way F Connector 	
Pin	Wire Colour	Circuit No.	Function
1	YEL	—	Diagnostic Link

X9 Connector

			
Connector Part Information		<ul style="list-style-type: none"> • 6-Way F Connector 	
Pin	Wire Colour	Circuit No.	Function
A	RED	—	Power To Heater
B	RED	—	Power From Battery
C-D	—	—	Not Used
E	RED	—	Power From Battery
F	RED	—	Power To Switch

Diagnostic Information and Procedures

Diagnostic Starting Point – Fuel Fired Heater

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the Description and Operation information will help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described is normal operation.

Diagnostic System Check – Fuel Fired Heater

Troubleshooting is normally limited to the isolation of defective components and provides information on defective wiring and connections.

The following possible causes for trouble have not been taken into consideration and must always be excluded as a possible cause for malfunctions:

- Power supply to heater is less than 22 volts at main power connections (charge batteries and perform load test).
- Blown fuses.
- Corrosion on battery terminals for heater, electrical wiring, connections and fuses.
- Loose contacts or connectors, wrong crimping on connectors.
- Ensure heater and components have been correctly installed following all pertaining installation instructions.

Troubleshooting Steps

After 3 consecutive unsuccessful startup attempts, the heater will lock itself out from any further start attempts.

The heater may also enter the lockout mode after experiencing an overheat condition. Before troubleshooting the heater, ensure heater is not in the "Lockout" mode by performing the following reset procedure:

1. Ensure switch is in the OFF position. Turn switch to the ON position. Remove fuse F1 (15 Amp). Refer to wiring diagram. Reinsert after 5 seconds.
2. Cycle switch OFF and then back ON once more. Remove fuse F1 once again and reinsert after 5 seconds. Heater should attempt to start in 10 seconds after inserting fuse. Coolant must be below the lower threshold before heater will attempt to start.

General Fault Symptoms

The following table lists possible fault symptoms of heaters in installed condition.

Caution: Troubleshooting requires profound knowledge about components and their theory of operation and may only be performed by trained personnel.

Caution: Troubleshooting is normally limited to the isolation of defective components and provides information on defective wiring and connections.

The following possible causes for trouble have not been taken into consideration and must always be excluded as a possible cause for malfunctions:

- Corrosion on connectors
- Loose contacts on connectors
- Wrong crimping on connectors
- Corrosion on wiring and fuses
- Corrosion on battery terminals

Smell of Fuel

Problem	Action
Fuel leak at vehicle integration.	Check fuel lines for leaks, kinks or obstructions.
Internal leak of the heater.	Remove heater for repair. Refer to Fuel Fired Heater Replacement.

Heater Does Not Achieve Full Load Operations

Problem	Action
Internal problem with the heater.	Remove the heater for repair. Refer to Fuel Fired Heater Replacement.

Continuous White Smoke During Combustion Operation

Problem	Action
Internal problem with the heater.	Remove the heater for repair. Refer to Fuel Fired Heater Replacement.

Heater Cannot Be Switched Off

Problem	Action
Internal failure of the switch.	Replace the switch. Refer to Fuel Fired Heater Switch Replacement.
Circuit short to power between switch and heater.	Repair damaged circuit.

Loss of Fuel (Dripping)

Problem	Action
Fuel leaking at vehicle integration.	Check fuel lines for leaks, kinks or obstructions.
Internal problem with the heater.	Remove the heater for repair. Refer to Fuel Fired Heater Replacement.

Loss of Coolant

Problem	Action
Definition: Heater develops smoke during combustion, smell of exhaust fumes extremely sweet.	
Leaking engine coolant.	Inspect the coolant hoses for leakage, kinks, loose hose clamps.
Internal problem with the heater.	Remove the heater. Refer to Fuel Fired Heater Replacement.

Diagnostic Trouble Code (DTC) List

Reading Diagnostic Trouble Codes

When the heater is activated by a switch, the types of malfunctions are indicated by coded flashing signals via the operation indicator light during the after-run period

of the heater. Actual fault flash codes are preceded by 5 quick-pulse flashes. Count the slow flashes only. The sequence is repeated until the heater completes the after-run cycle and shuts down. The coded flashing signals correspond to the numbers in the table below.

DTC List

DTC	Description	Possible Cause
F01	No Start-Up	Fuel Supply Restricted air flow through intake or exhaust
F02	Flame Extinguished	Fuel Supply Restricted air flow through intake or exhaust
F03	Under/Over Voltage	Vehicle charging system
F04	Premature flame detection	Replace Heater
F05	Circulating pump interruption or short circuit	Open or shorted wiring Defective pump
F06	Temperature sensor Interruption or short circuit	Replace Heater
F07	Fuel Metering pump interruption or short circuit	Open or shorted wiring
F08	Combustion air fan motor interruption, short circuit or incorrect fan speed	Replace Heater
F09	Pencil type glow plug/flame detector interruption or short circuit	Replace Heater
F10	Overheating condition	Coolant flow restriction Circulation pump

Heater Will Not Start Up

Step	Action	Yes	No
1	Did you review the Fuel Fired Heater Description and Operation?	Go to Step 2	Go to Description and Operation
2	Turn the fuel fired heater switch to the ON position. Is the combustion fan running?	Go to Step 3	Go to Combustion Fan Inoperative
3	Inspect the combustion air intake tube for damage or obstructions. Is the tube damaged or obstructed?	Go to Step 5	Go to Step 4
4	Inspect the combustion exhaust tube for damage or obstructions. Is the tube damaged or obstructed?	Go to step 6	Go to Step 7

Heater Will Not Start Up (cont'd)

Step	Action	Yes	No
5	Repair or replace the air intake tube or remove the obstruction accordingly. Did you complete the repair?	Go to step 12	—
6	Repair or replace the exhaust tube or remove the obstruction accordingly. Did you complete the repair?	Go to Step 12	—
7	Does the fuel pump operate (clicking) during start-up cycle approx. 30 sec. after switching ON?	Go to Step 8	Go to Fuel Pump Inoperative
8	1. Turn heater switch OFF. 2. Disconnect fuel line from heater. 3. Turn the heater switch ON. Is the flow lower than 10.3 ml (\pm 10%) per minute?	Go to Fuel Pump Volume Low	Go to Step 9
9	Does the coolant pump operate when the heater is running (can you feel or hear the pump running)?	Go to Step 10	Go to Coolant Pump Inoperative
10	Does the heater start and operate normally?	Go to Testing for Intermittent and Poor Connection in Wiring Systems of C-31-Q44-000/MN-001	Go to Step 11
11	Check coolant hoses for obstructions, kinked hoses, low coolant level and proper hose routing. Did you find and correct the condition?	Go to Step 12	Go to Diagnostic Starting Point Engine Cooling in Engine Cooling of C-31-Q44-000/MN-001
12	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Combustion Fan Inoperative

Step	Action	Value(s)	Yes	No
1	Did you review the Fuel Fired Heater Description and Operation?	—	Go to Step 2	Go to Description and Operation
2	1. Using a DMM measure the voltage at Connector X1, pin 1. 2. Turn the fuel fired heater switch to the ON position. Is the voltage near the specified value?	24V	Go to Step 4	Go to Step 3.
3	Using a DMM measure the voltage at the switch connector X6, pin 3. Is the voltage near the specified value?	24V	Go to Step 7	Go to Step 5

Combustion Fan Inoperative (cont'd)

Step	Action	Value(s)	Yes	No
4	Using a DMM measure the voltage at the heater connector X2, pin 1. Is the voltage near the specified valve?	24V	Go to step 9	Go to Step 12
5	Using a DMM measure the voltage at the switch connector X6, pin 2. Is the voltage near the specified valve?	24V	Go to step 6	Go to Step 8
6	Replace the fuel fired heater switch. Refer to Fuel Fired Heater Switch Replacement. Did you complete the replacement?	—	Go to Step 13	—
7	Test the circuit for poor connections, high resistance or an open. Did you find and correct the condition?	—	Go to Step 13	—
8	Test the fuse F2/circuit for an open, high resistance or poor connections. Did you find and correct the condition?	—	Go to Step 13	—
9	Check the ground circuit at heater connector X2, pin 2. Is the ground circuit complete?	—	Go to Step 11	Go to Step 10
10	Repair the open, high resistance or poor connection. Did you and correct the condition?	—	Go to Step 13	—
11	Replace the fuel fired heater. Refer to Fuel Fired Heater Replacement. Did you complete the replacement?	—	Go to Step 13	—
12	Test the fuse F1/circuit for an open, high resistance or poor connections. Did you find and correct the condition?	—	Go to Step 13	—
13	Operate the system in order to verify the repair. Did you correct the condition?	—	System OK	Go to Step 2

Fuel Pump Inoperative

Step	Action	Yes	No
1	Did you review the Fuel Fired Heater Description and Operation?	Go to Step 2	Go to Descriptions and Operations
2	1. Connect a test lamp to the fuel pump connector. 2. Turn the fuel fired heater switch to the ON position. Does the test lamp blink slowly after 30 seconds?	Go to Step 4	Go to Step 3
3	Test the fuel pump harness for damage, loose connections or an open. Did you find and correct the condition?	Go to Step 8	Go to Step 5

Fuel Pump Inoperative(cont'd)

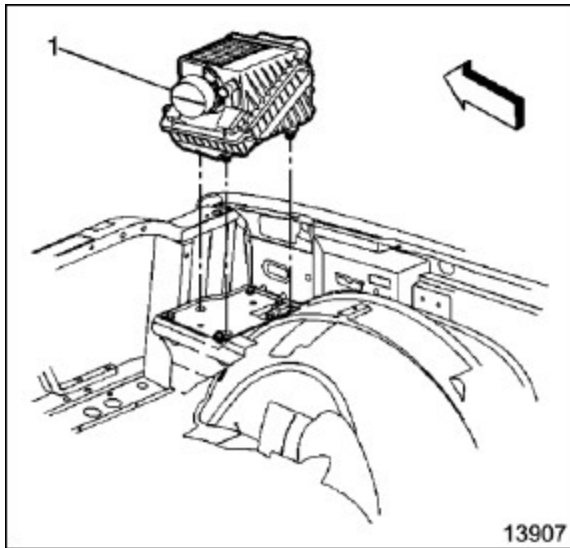
Step	Action	Yes	No
4	1. Reconnect the fuel pump. 2. Turn the fuel fired heater switch to the ON position. 3. Lightly TAP on the fuel pump body. Does the fuel pump begin to click?	Go to Step 6	Go to Step 7
5	Replace the fuel fired heater. Refer to Fuel Fired Heater Replacement. Did you complete the replacement?	Go to Step 8	—
6	System should resume normal operations. NOTE: Pump may have been stuck due to dirt or a long period of no operation. Does the system operate normally?	Go to Step 8	Go to Step 2
7	Replace the fuel pump. Refer to Fuel Pump Replacement. Did you complete the replacement?	Go to Step 8	—
8	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Coolant Pump Inoperative

Step	Action	Yes	No
1	Did you review the Fuel Fired Heater Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Remove the centre plastic cover from the heater. 2. Disconnect the coolant pump connector X5. 3. Using a fused jumper apply 24V to connector X5 pin 1. 4. Ground connector X5, pin 2. Does the pump operate?	Go to Step 3	Go to Step 4
3	Replace the fuel fired heater. Refer to Fuel Fired Heater Replacement. Did you complete the replacement?	Go to Step 6	—
4	1. Remove the coolant pump. 2. Remove the pump cover. 3. Clean the pump accordingly. 4. Install the pump. Does the pump operate?	Go to Step 6	Go to Step 5
5	Replace the coolant pump. Refer to Fuel Fired Coolant Pump Replacement. Did you complete the replacement?	Go to Step 6	—
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Fuel Pump Volume Low

Step	Action	Yes	No
1	Did you review the Fuel Fired Heater Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Disconnect the fuel line from the heater. 2. Turn the heater switch ON. Is the flow lower than 10.3 ml ($\pm 10\%$) per minute?	Go to Step 3	Go to Testing for Intermittent and Poor Connection in Wiring Systems of C-31-Q44-000/MN-001
3	Are air bubbles visible in the fuel line?	Go to Step 4	Go to Step 6
4	Inspect the fuel circuit for loose clamps. Did you find and correct the condition?	Go to Step 10	Go to Step 5
5	Fill the fuel tank with sufficient fuel to reach the fuel stand pipe inlet. Is the action complete?	Go to Step 10	—
6	1. Turn the heater switch OFF. 2. Disconnect the fuel line at the pump. 3. Turn the heater switch ON.	Go to Step 9	Go to Step 7
7	1. Using a DMM verify correct operating voltage at connector X7 pin B. 2. Verify correct operation of the fuel pump ground circuit. Was a problem found?	Go to Step 10	Go to Step 8
8	Replace the fuel pump. Refer to Fuel Pump Replacement. Did you complete the replacement?	Go to Step 10	—
9	Repair/replace the damaged fuel line. Did you complete the repair?	Go to Step 10	—
10	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

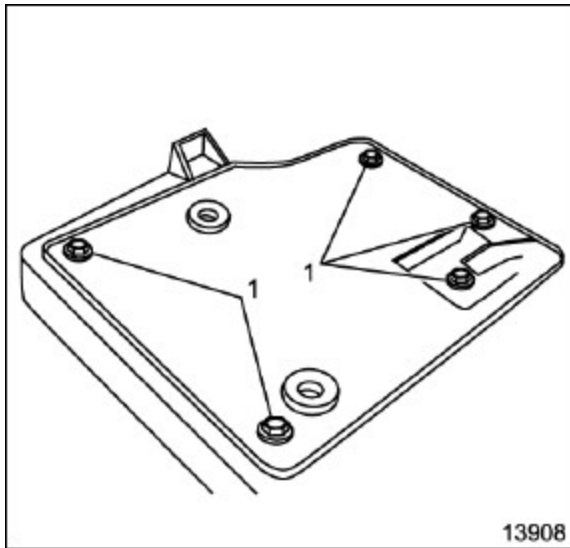


Repair Instructions

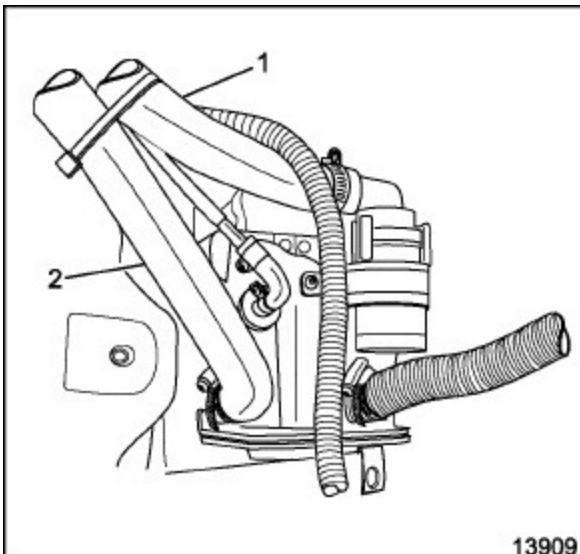
Fuel Fired Coolant Inlet Hose Replacement

Removal Procedure

1. Remove the air cleaner assembly (1). Refer to Air Cleaner Assembly Replacement in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

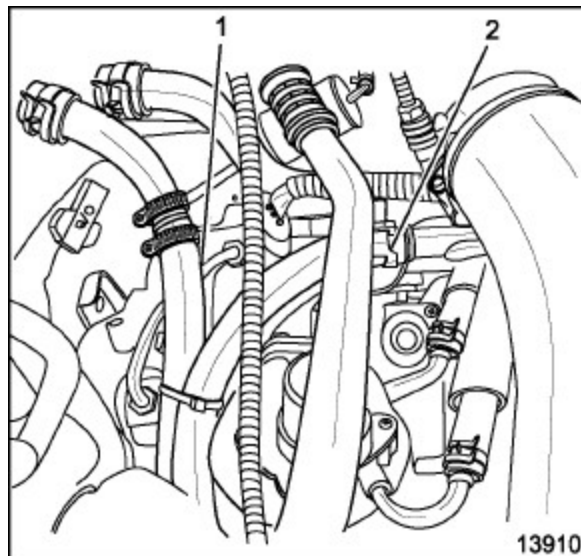


2. Remove the air cleaner assembly bracket bolts (1) and remove the bracket.
3. Drain the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



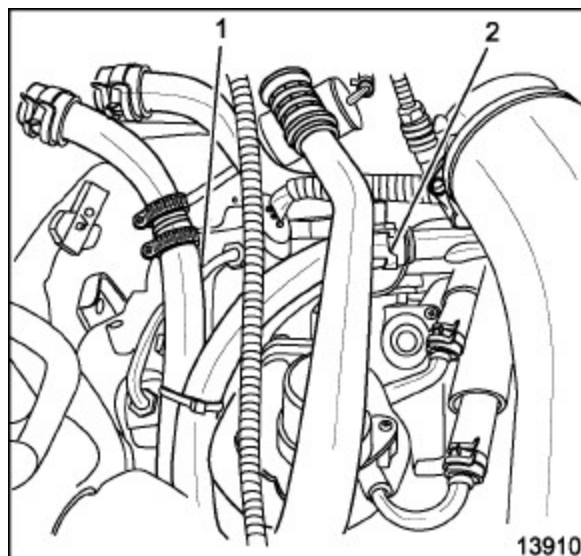
4. Loosen the inlet hose clamp and remove hose (1) from heater.

5. Loosen hose clamp and slide clamp back and remove the hose (2).
6. Remove the wraps and remove hose from vehicle. Note routing location of hose for reassembly.

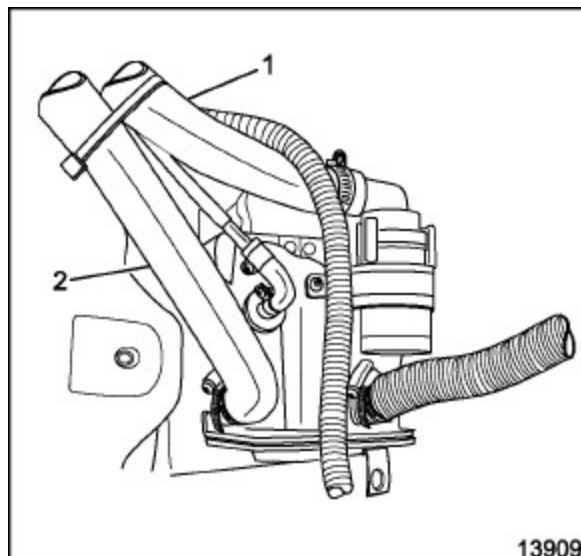


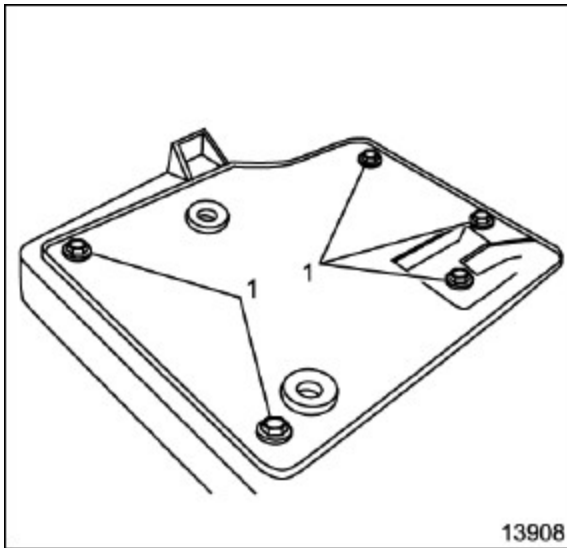
Installation Procedure

1. Install the inlet hose in the same routing location as removed secure with tie-wraps.
2. Install the hose (2) and clamp to the coolant pipe.



3. Install the hose (1) and clamp to the heater secure with clamp.



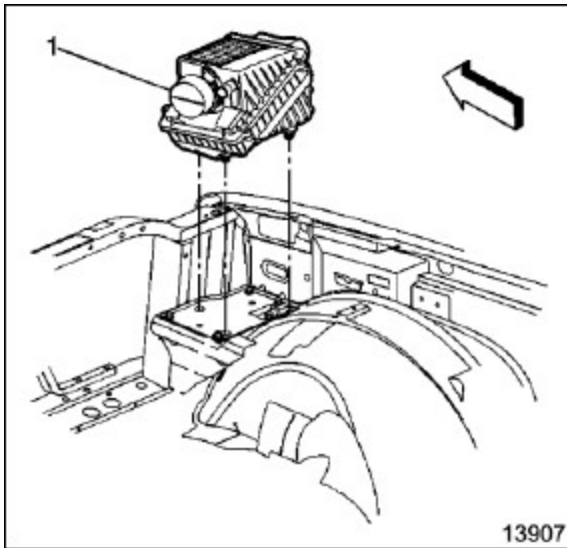


Notice: Refer to Fastener Notice in Cautions and Notices.

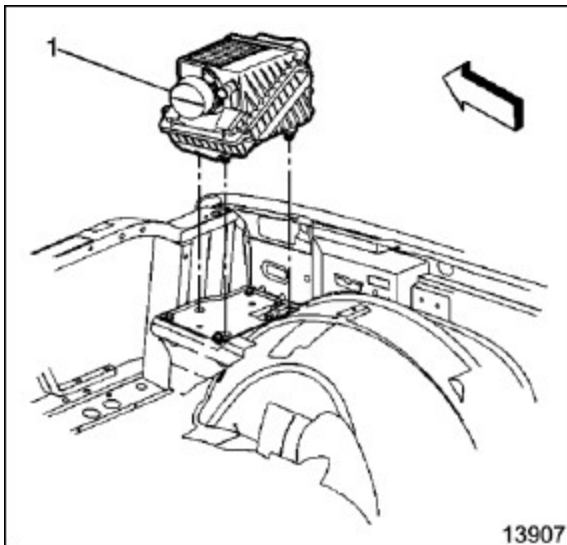
4. Install the air cleaner assemble bracket and secure with bolts (1).

Tighten

Tighten bracket bolts to 9 N•m (80 lb in).



5. Install the air cleaner assembly (1). Refer to Air Cleaner Assembly Replacement in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
6. Fill the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
7. Run the engine and heater to inspect for leaks.

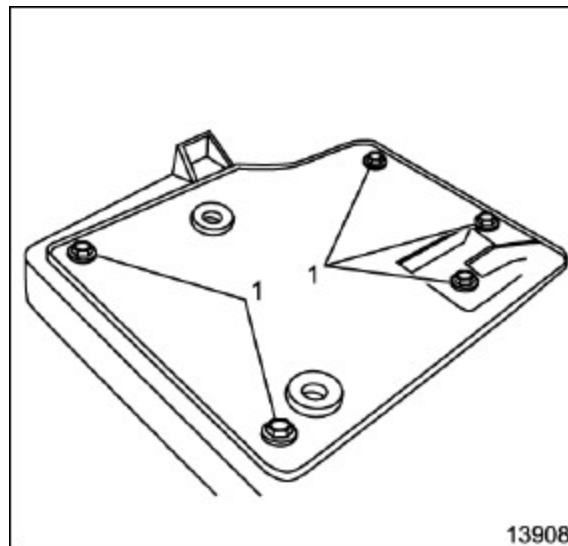


Fuel Fired Coolant Outlet Hose Replacement

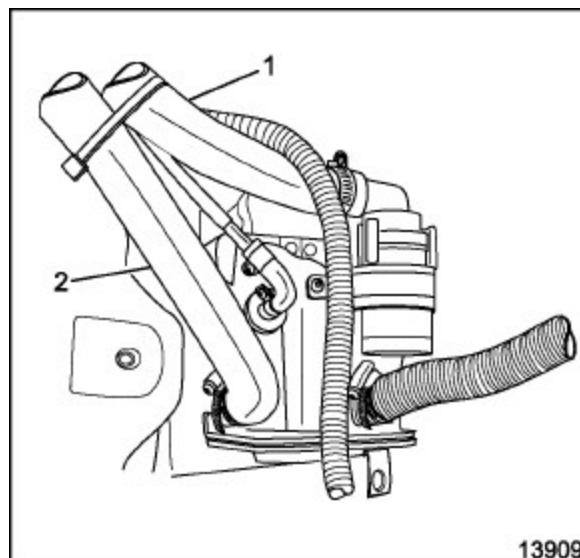
Removal Procedure

1. Remove the air cleaner assembly (1). Refer to Air Cleaner Assembly Replacement in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

2. Remove the air cleaner assembly bracket bolts (1) and remove the bracket.
3. Drain the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

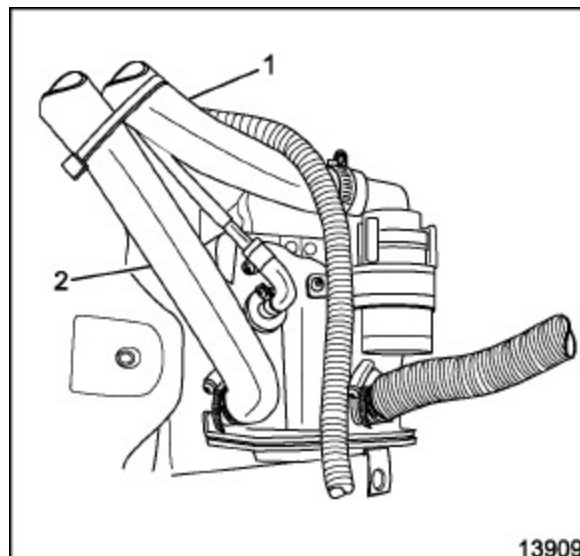


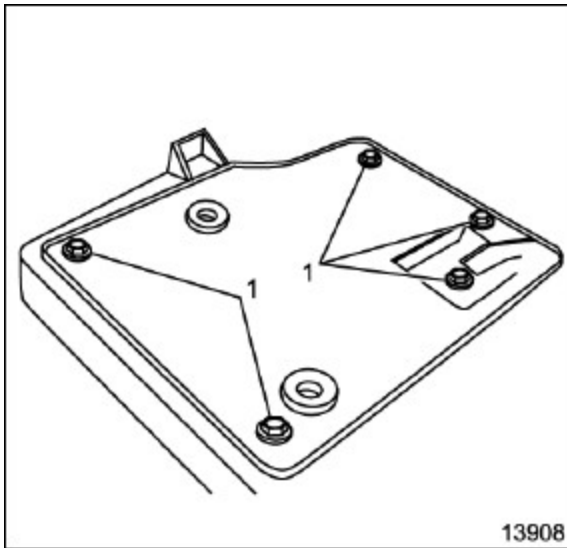
4. Loosen the outlet hose clamp and remove hose (2) from heater.
5. Loosen the outlet hose clamp from the splice connector and remove hose.
6. Remove tie-wraps and remove hose from vehicle. Note routing location of the hose for reassembly.



Installation Procedure

1. Install the outlet hose in the same routing location as removed secure with tie-wraps.
2. Connect the outlet heater hose to the splice correction, firmly and secure with clamp.
3. Install the hose (2) and clamp to the heater secure with clamp.



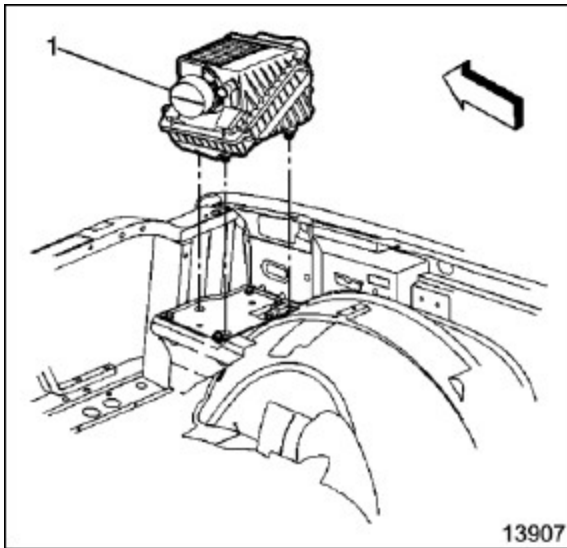


Notice: Refer to Fastener Notice in Cautions and Notices.

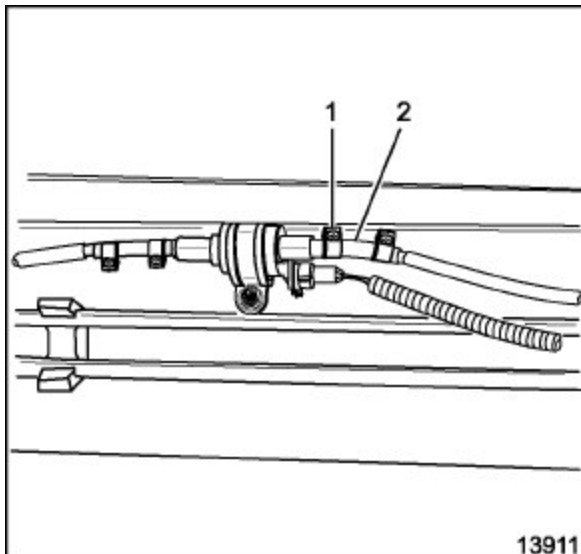
4. Install the air cleaner assemble bracket and secure with bolts (1).

Tighten

Tighten bracket bolts to 9 N•m (80 lb in).



5. Install the air cleaner assembly (1). Refer to Air Cleaner Assembly Replacement in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
6. Fill the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
7. Run the engine and heater to inspect for leaks.

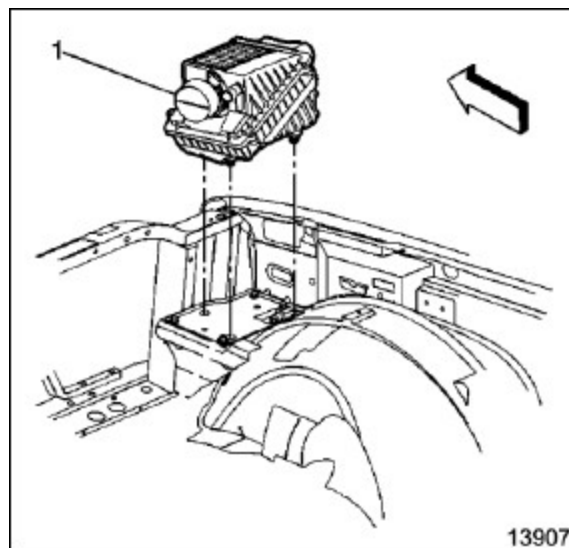


Fuel Hose Replacement – Fuel Pump to Heater

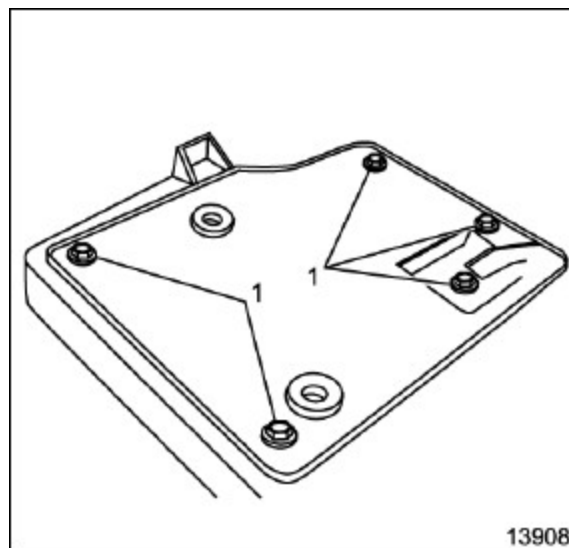
Removal Procedure

1. Remove the front skid plate. Refer to Front Skid Plate Replacement in Frame and Underbody.
2. Remove the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
3. Loosen the clamp (1) and remove the hose (2) from the dose pump.

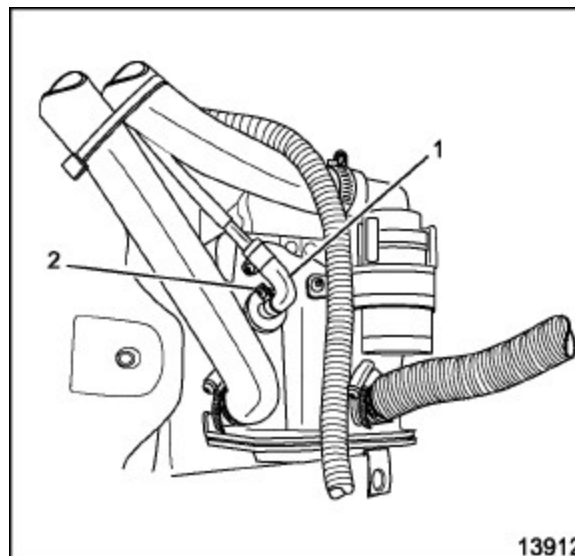
4. Remove the air cleaner assembly (1). Refer to Air Cleaner Assembly Replacement in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

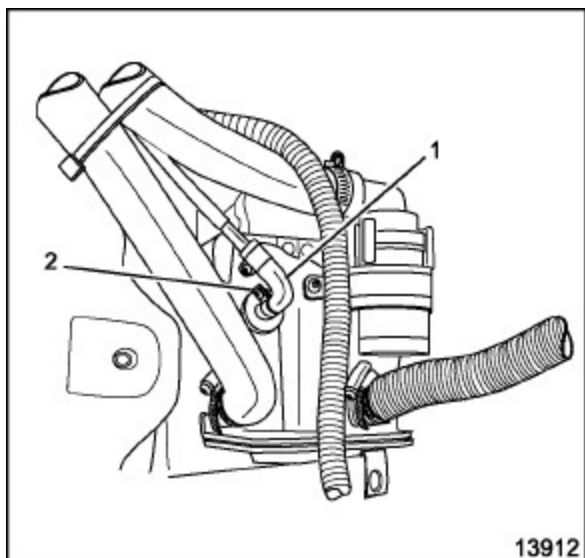


5. Remove the air cleaner assembly bracket bolts (1) and remove the bracket.



6. Loosen the clamp (2) and remove the hose (1) from the heater.
7. Remove the tie-wraps and remove hose from vehicle. Note routing location for reassembly.





Installation Procedure

Notice: Always cut Mecanyl fuel line with a sharp razor knife or razor edged cutter. Do NOT cut with side cutters, scissors or similar tools as doing so will cause a restriction inside the fuel line.

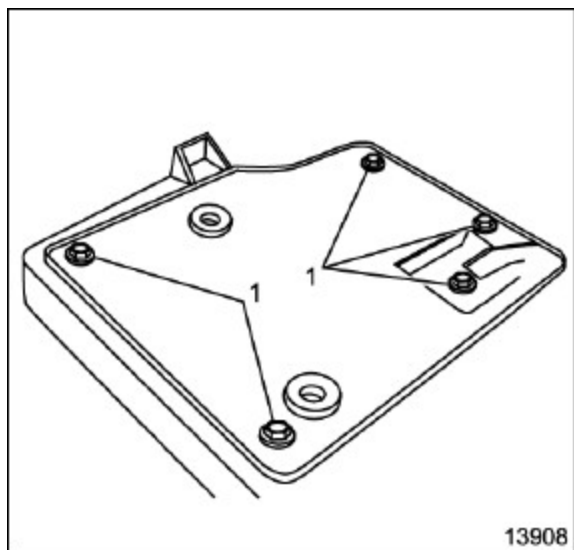
1. Install the hose in the same location as removed, secure with tie-wraps.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the hose (1) and clamp (2), secure clamp.

Tighten

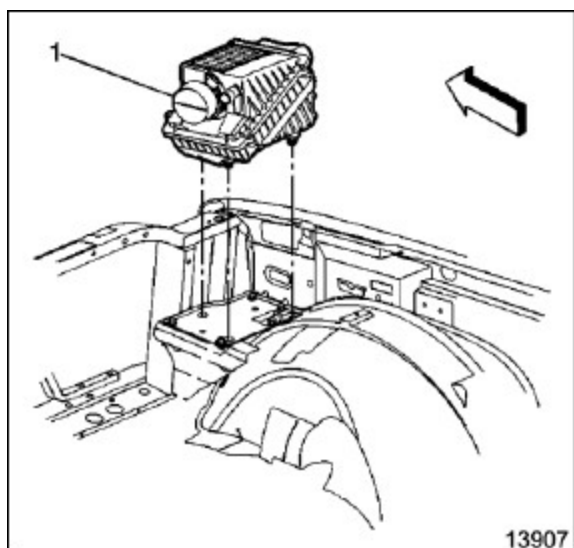
Tighten clamp to 1.4 N•m (12 lb in).



3. Install the air cleaner assembly bracket and bolts (1).

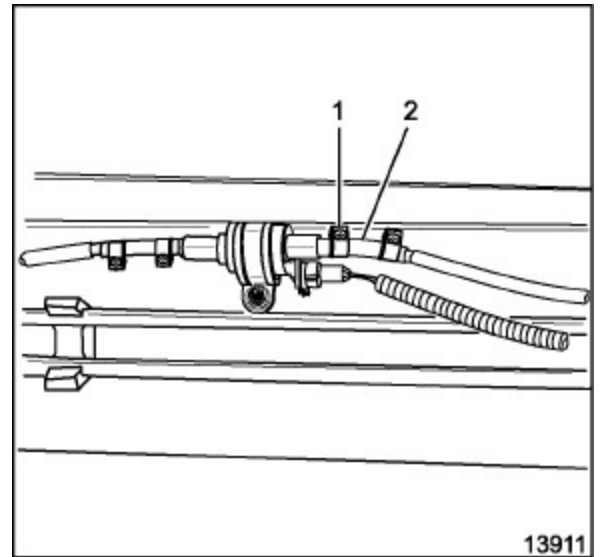
Tighten

Tighten bracket bolts to 9 N•m (80 lb in).



4. Install the air cleaner assembly (1). Refer to the Air Cleaner Assembly Replacement in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

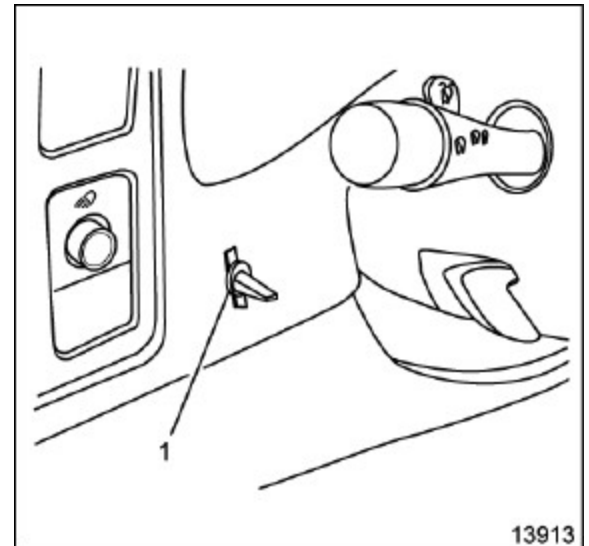
5. Install the hose (2) and clamp (1) to the dose pump and tighten clamp.
Tighten
Tighten clamp to 1.4 N•m (12 lb in).
6. Install the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
7. Install the front skid plate. Refer to Front Skid Plate Replacement in Frame and Underbody.
8. Run the engine and heater to inspect for leaks.



Fuel Fired Heater Switch Replacement

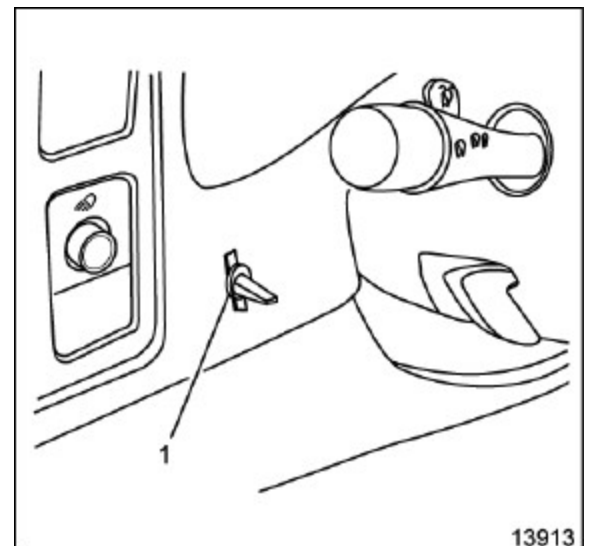
Removal Procedure

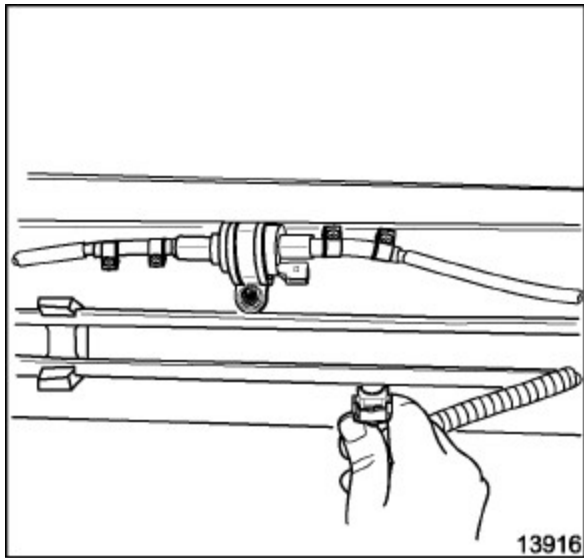
1. Remove the I/P bezel. Refer to Bezel Replacement in Instrument Panel, Gages, and Console in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
2. Remove the electrical connections from the back of the switch.
3. Remove the switch nut (1) and remove the switch from the bezel.



Installation Procedure

1. Install the switch into the opening in the bezel and install nut (1).
2. Install electrical connectors in the same location as removed.
3. Install the I/P bezel. Refer to Refer to Bezel Replacement in Instrument Panel, Gages, and Console in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



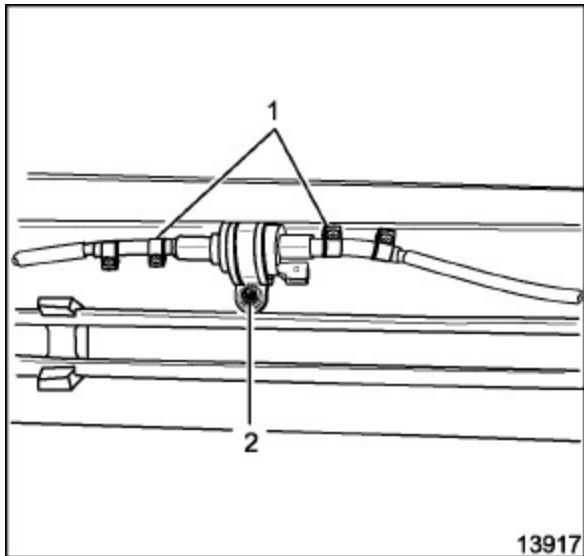


Fuel Pump Replacement

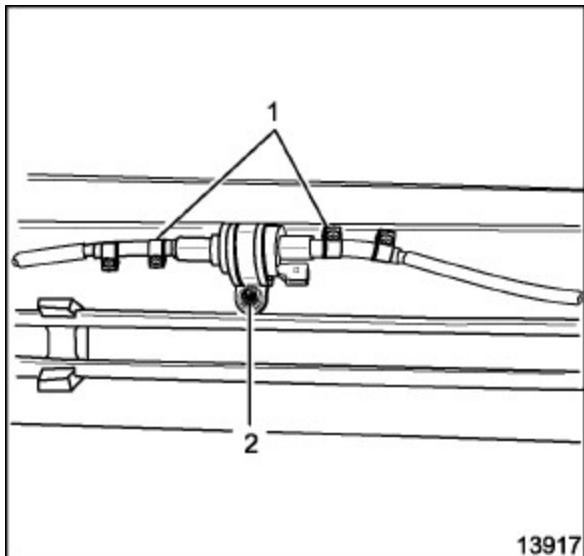
Removal Procedure

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Remove the rear skid plate. Refer to *Rear Skid Plate Replacement in Frame and Underbody*.
3. Clamp off the fuel inline to prevent fuel leakage.
4. Remove the harness connector from the dosing pump.



5. Loosen the hose clamps (1).
6. Remove the bracket bolt (2).
7. Remove the dosing pump from the fuel lines.
8. Remove the dosing pump from the vehicle.



Installation Procedure

1. Install the dosing pump to the vehicle.

Notice: Refer to *Fastener Notice in Cautions and Notices*.

2. Install the bracket nut (2).

Tighten

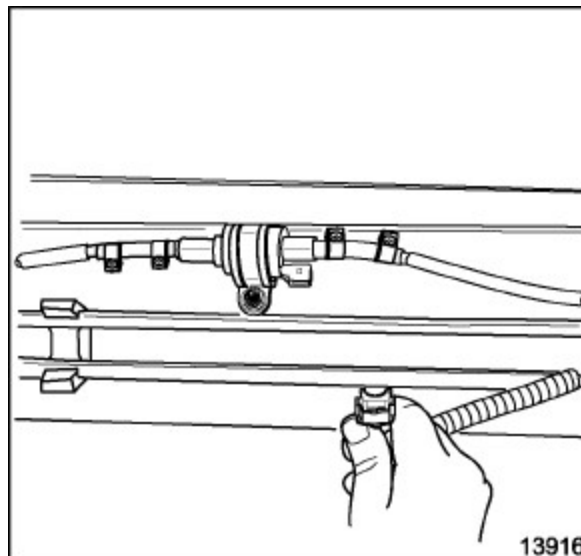
Tighten bracket bolts to 10 N•m (88 lb in).

3. Install the fuel lines, position the clamps (1) and tighten.

Tighten

Tighten clamps to 1.4 N•m (12 lb in).

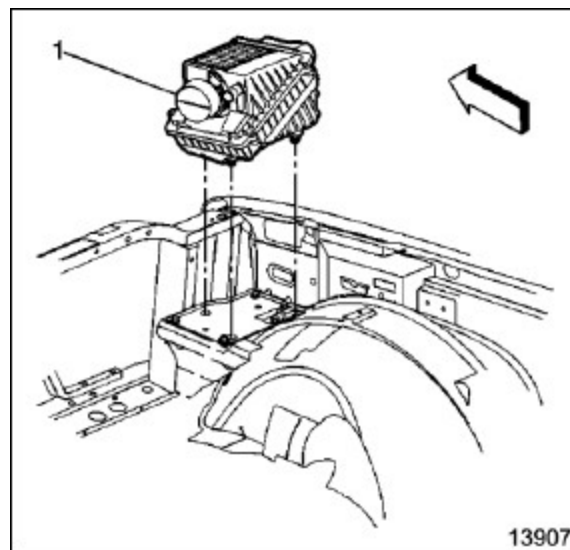
4. Install the harness connector to the dosing pump.
5. Remove the clamp from the fuel inlet line.
6. Install the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
7. Remove supports and lower the vehicle.
8. Run vehicle engine and heater check for leaks.



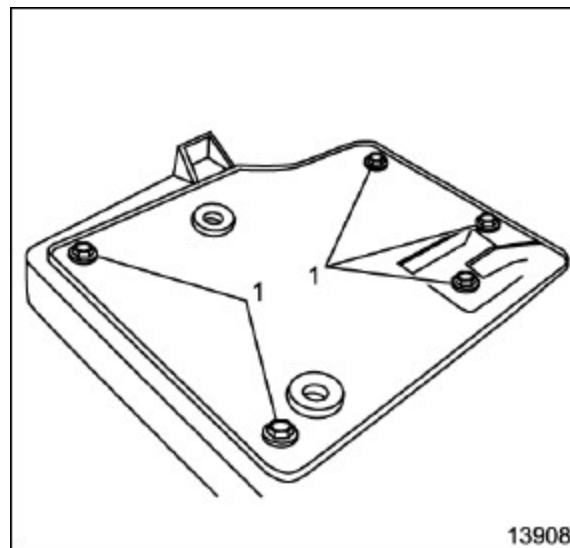
Fuel Fired Heater Replacement

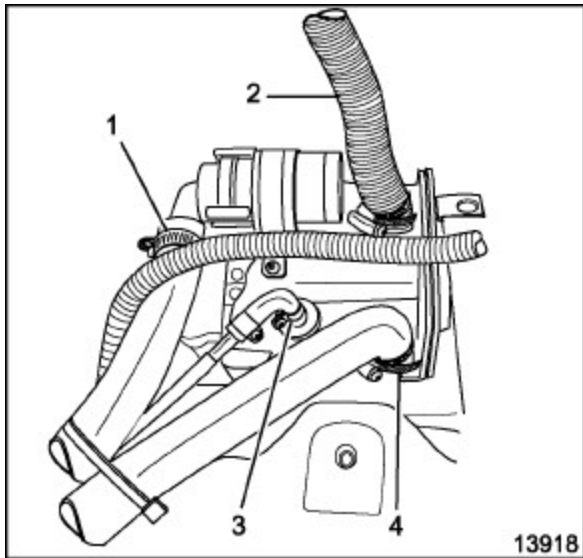
Removal Procedure

1. Remove the air cleaner assembly (1) Refer to Air Cleaner Assembly Replacement in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

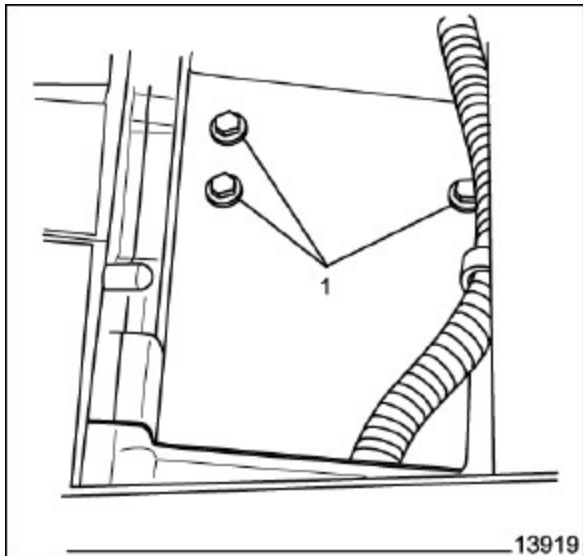


2. Remove the air cleaner assembly bracket bolts (1) and remove bracket.
3. Drain the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

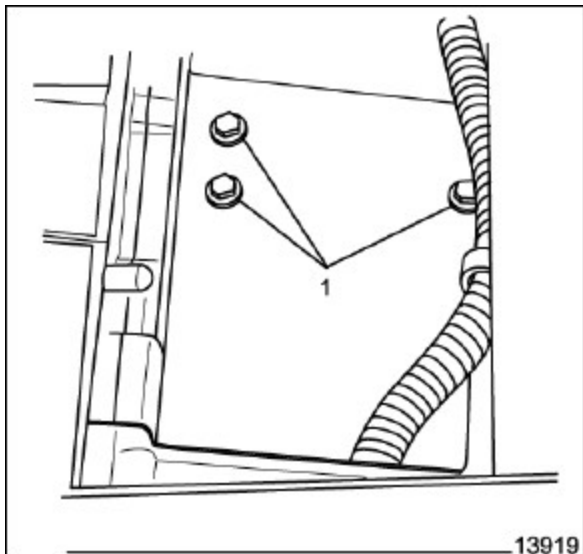




4. Remove the coolant inlet hose clamp and remove the inlet hose (1).
5. Remove the coolant outlet hose clamp and remove the outlet hose (4).
6. Remove combustion air inlet hose clamp and remove the inlet hose (2).
7. Remove the fuel inlet hose clamp, remove and plug the hose (3).
8. Remove the exhaust gas outlet hose clamp and remove the outlet hose.
9. Disconnect the electrical connectors.



10. Remove the front portion of the right wheelhouse panel. Refer to Wheelhouse Panel Replacement in Body Front End in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
11. Remove the bolts (1) from the heater.
12. Remove heater from the bottom of the vehicle.

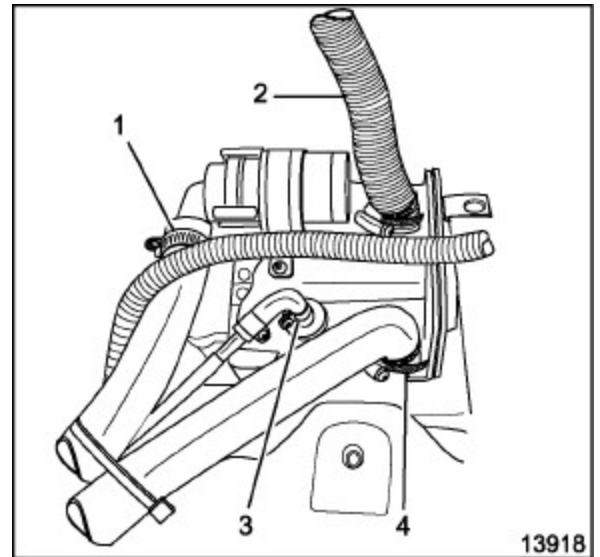


Installation Procedure

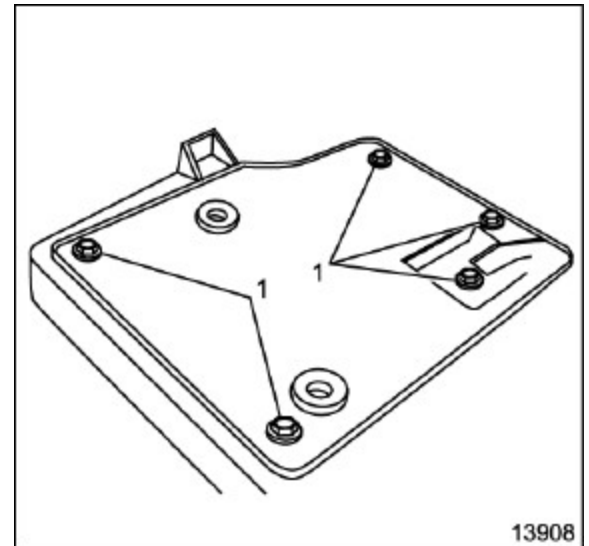
Notice: Refer to Fastener Notice in Cautions and Notices.

1. Install the heater to the bracket and install bolts (1).
Tighten
Tighten heater bolts to 10 N•m (88 lb in).
2. Connect the electrical connections.
3. Install the exhaust gas outlet hose and clamp, secure clamp.

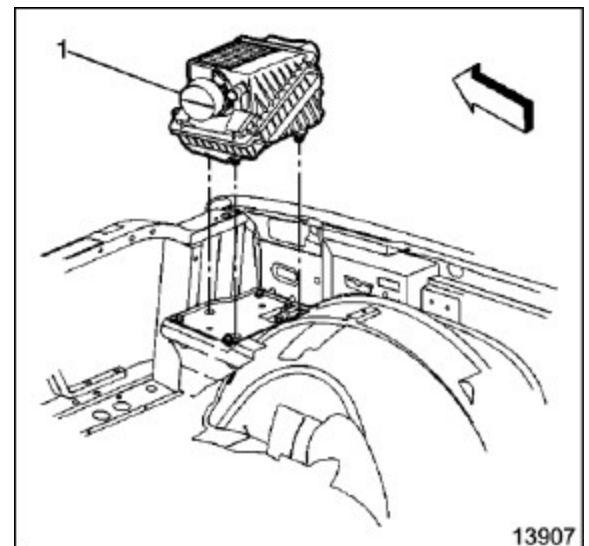
4. Install the fuel inlet hose (3) and clamp, tighten clamp.
Tighten
Tighten clamp to 1.4 N•m (12 lb in).
5. Install the combustion air inlet hose (2) and clamp, secure clamp.
6. Install the coolant outlet hose (4) and clamp, secure clamp.
7. Install the coolant inlet hose (1) and clamp, tighten clamp.
Tighten
Tighten clamp to 1.4 N•m (12 lb in).

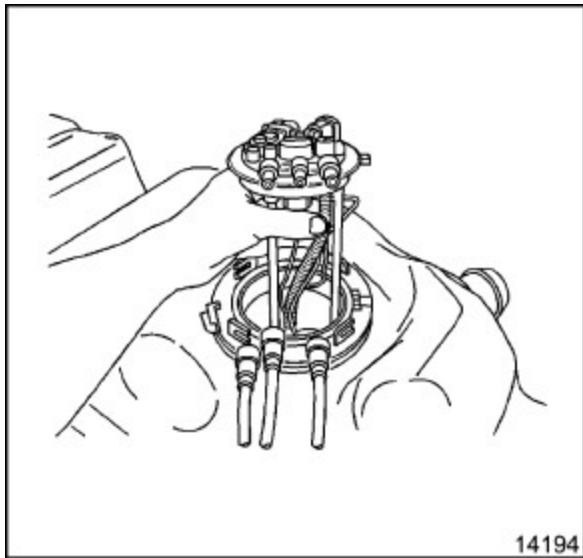


8. Install the air cleaner assembly bracket and bolts (1).
Tighten
Tighten bracket bolts to 9 N•m (81 lb in).



9. Install the air cleaner assembly (1). Refer to Air Cleaner Replacement in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
10. Fill the cooling system. Refer to Draining and Filling Cooling System in Engine Cooling in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
11. Run engine and heater, inspect for leaks.
12. Install the right front wheelhouse panel. Refer to Wheelhouse Panel Replacement in Body Front End in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

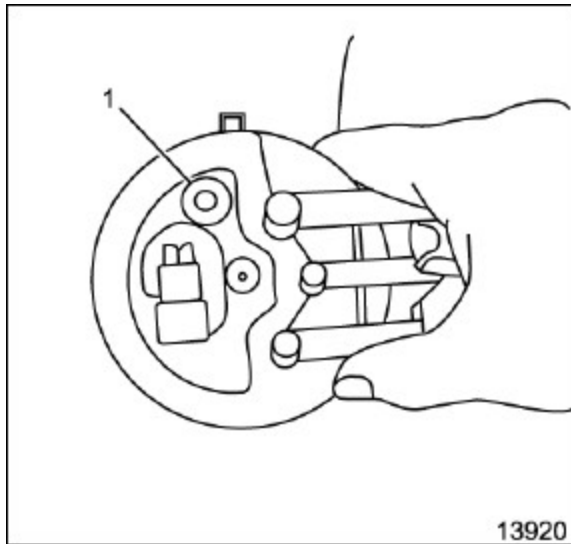




Fuel Tank Sender Modification

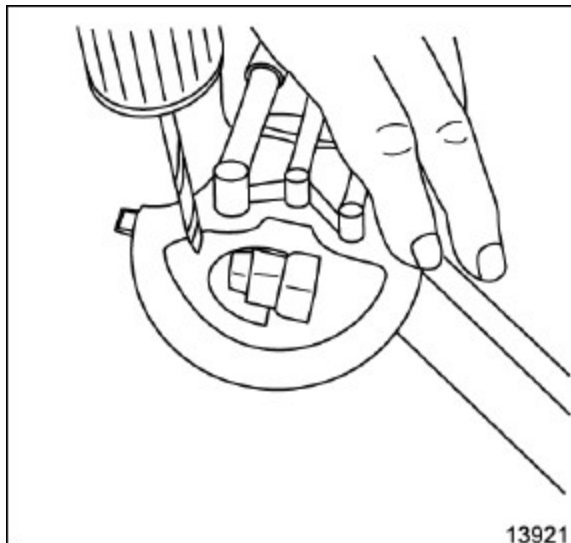
Removal Procedure

1. Remove the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
2. Remove the fuel tank protection cover.
3. Remove the fuel tank. Refer to Fuel Tank Replacement Pickup in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
4. Remove fuel sender unit from fuel tank. Refer to Fuel Sender Assembly Replacement in Engine Controls - 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



Modification Procedure

1. Using the fuel standpipe washer as a template, place the washer in exact location (1) on the fuel sender and outline center hole with a marker. This will be the location for the fuel standpipe.



2. Centre punch and drill 9.5 mm (3/8 in) hole where marked.

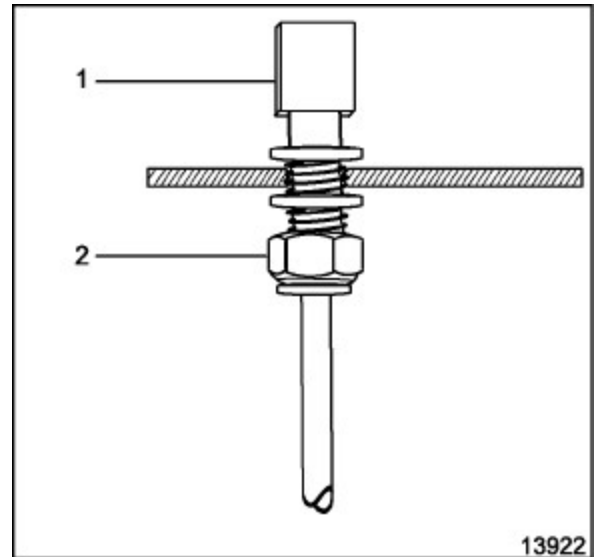
- To prevent fuel seepage around standpipe, remove burrs from both sides of hole after drilling.

Notice: Refer to Fastener Notice in Cautions and Notices.

- Place one sealing washer on standpipe. Insert standpipe through hole from underside of sender unit. Place second sealing washer on standpipe. Place nut (2) on pipe (1) and tighter.

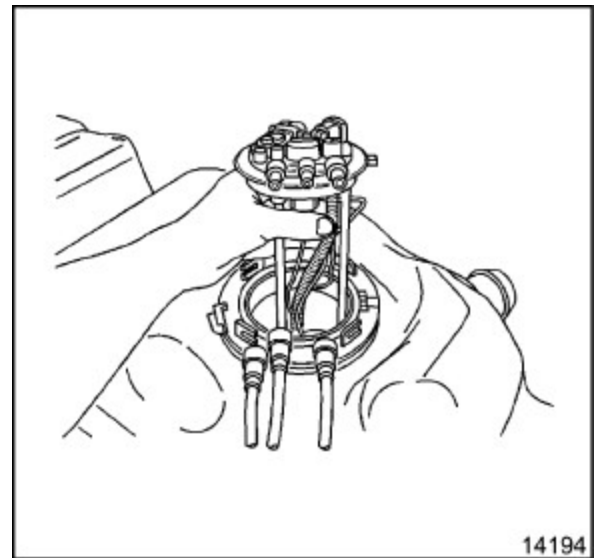
Tighten

Tighten stand pipe nut to 9.5 N•m (84 lb in).



Installation Procedure

- Install the fuel sender unit. Refer to Fuel Sender Assembly Replacement in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
- Install the fuel tank. Refer to Fuel Tank Replacement Pickup in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
- Install the fuel tank protection cover.
- Install the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.

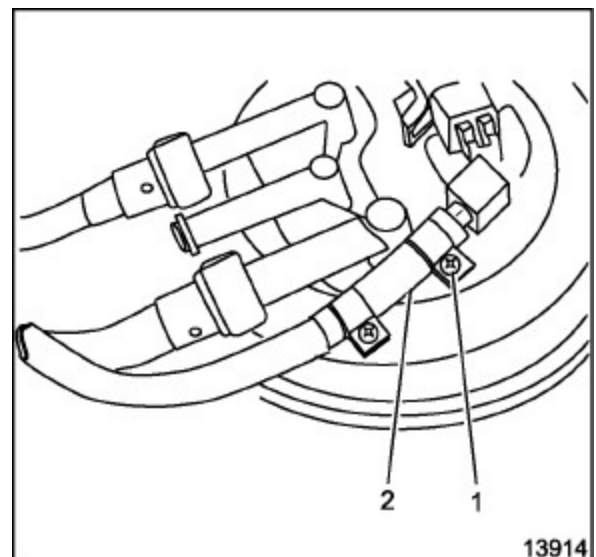


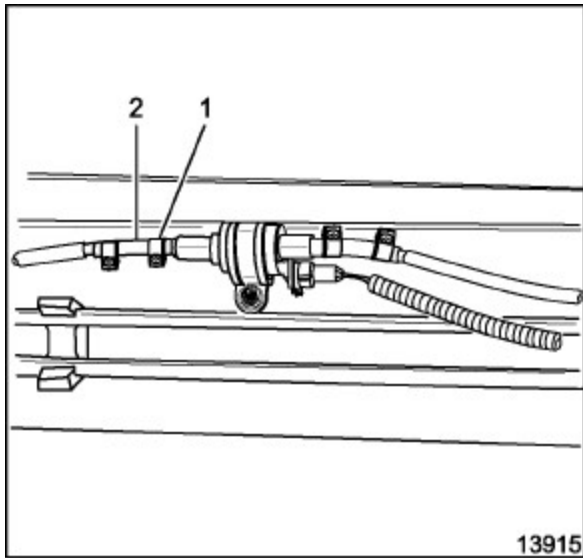
Fuel Hose Replacement – Tank to Fuel Pump

Notice: Always cut Mecanyl fuel line with a sharp razor knife or razor edged cutter. Do NOT cut with side cutters, scissors or similar tools as doing so will cause a restriction inside the fuel line.

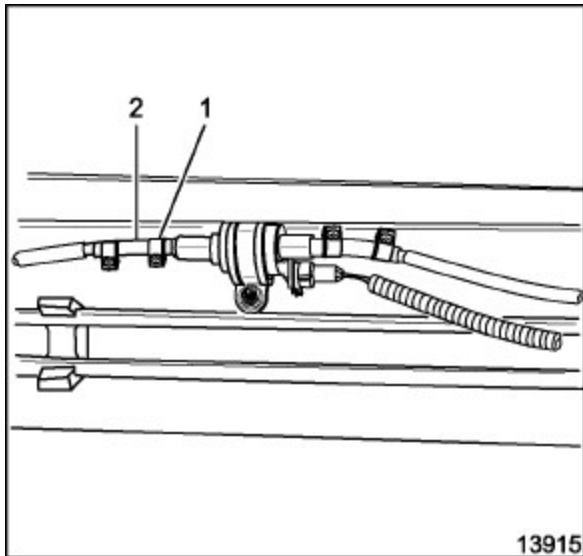
Removal Procedure

- Remove the fuel tank shield.
- Remove the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
- Remove the fuel tank. Refer to Fuel Tank Replacement Pickup in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
- Loosen the clamp (1) and remove the hose (2).





5. Loosen the clamp (1) and remove the hose (2) from the dose pump.
6. Remove the tie-wraps, securing the line.
Note removal location for reassembly.



Installation Procedure

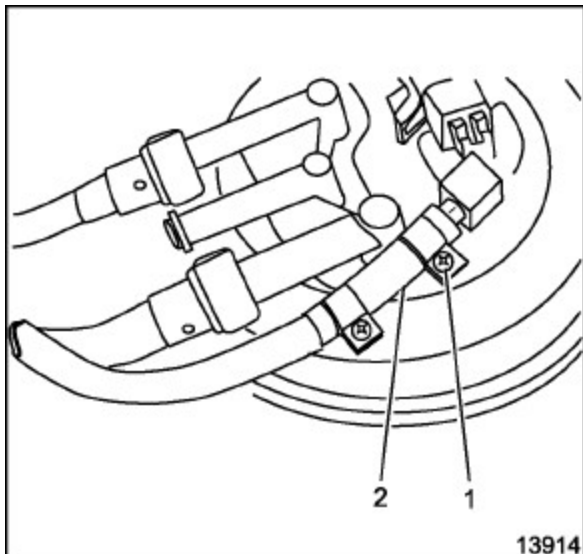
1. Install the inlet hose to the vehicle in the same location as removed.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the hose (2) and clamp (1) to the dose pump.

Tighten

Tighten clamp to 1.4 N•m (12 lb in).

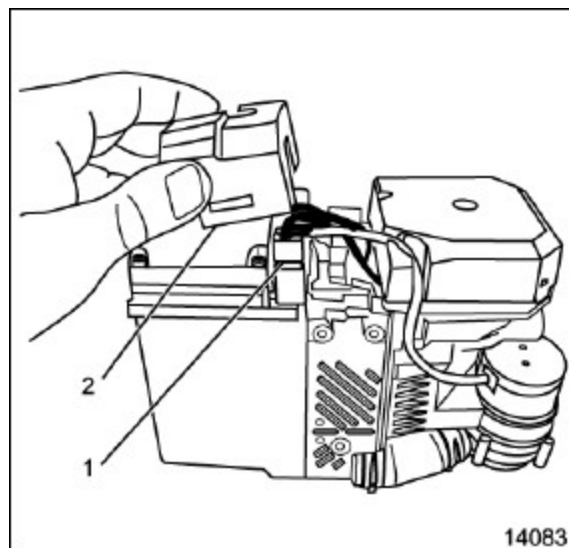


3. Install the hose (2) and clamp (1) to the fuel tank.
Tighten
Tighten clamp to 1.4 N•m (12 lb in).
4. Install the fuel tank. Refer to Fuel Tank Replacement Pickup in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
5. Install the fuel tank shield.
6. Install the rear skid plate. Refer to Rear Skid Plate Replacement in Frame and Underbody.
7. Run the engine and the fuel fired heater and inspect for leaks.

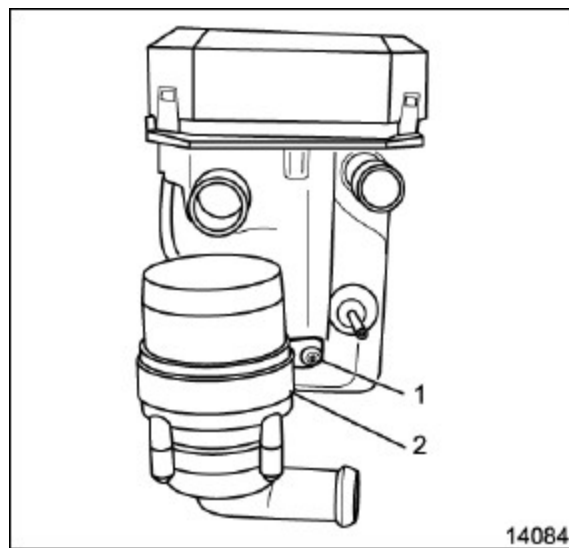
Fuel Fired Coolant Pump Replacement

Removal Procedure

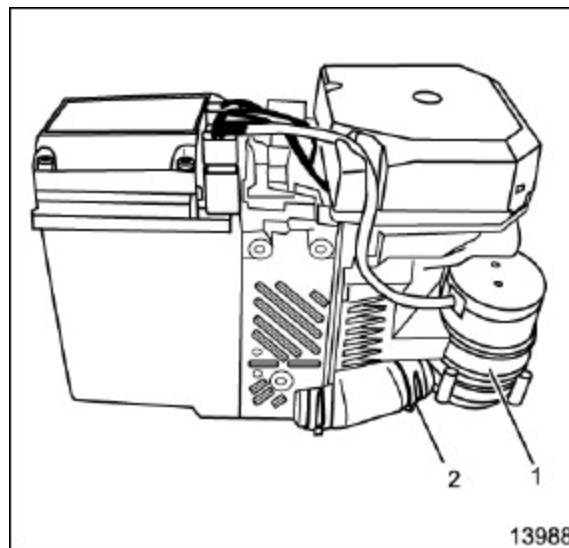
1. Remove the fuel fired heater. Refer to Fuel Fired Heater Replacement.
2. Remove the top cover (2).
3. Remove the pump connector (1).

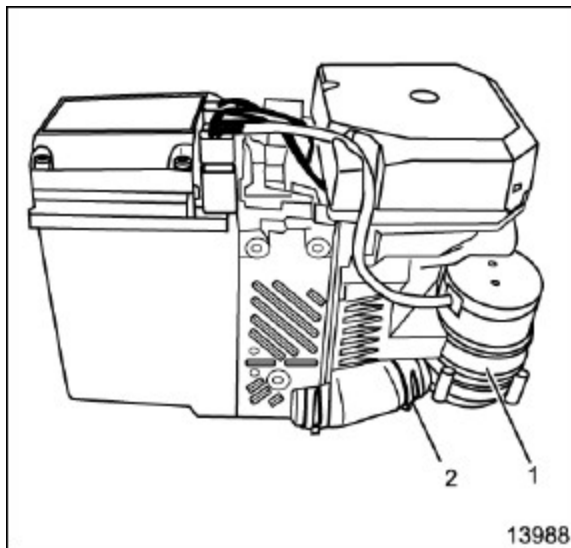


4. Remove the retaining bolt (1).
5. Remove the coolant pump retainer (2).

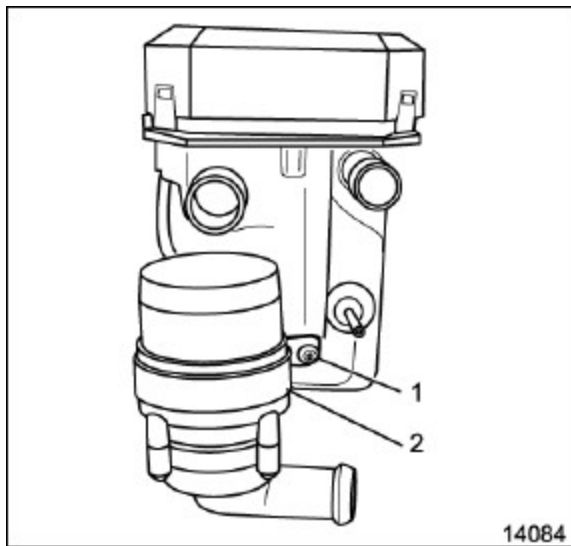


6. Slide the clamp (2) back from the pump.
7. Remove the pump (1).

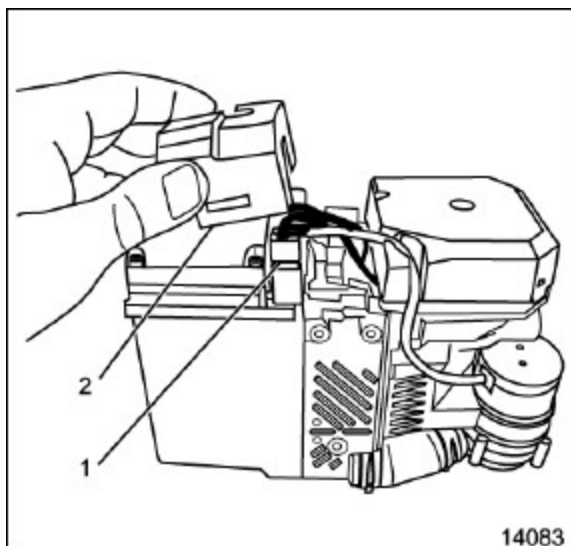


**Installation Procedure**

1. Install the pump (1) onto the hose.
2. Slide the clamp (2) into position.



3. Install the pump retainer (2).
4. Install the retainer bolt (1).



5. Install the connector (1).
6. Install the top cover (2).
7. Install the fuel fired heater. Refer to Fuel Fired Heater Replacement.

Description and Operation

General Description

Caution:

To Prevent Asphyxiation: DO NOT operate heater while in confined spaces such as closed, unventilated garages. Open an outside garage door before operating the heater.

To Prevent Fire: DO NOT operate heater where flammable or explosive materials, gases or dust may be present. DO NOT operate heater over dry grass or other dry ground cover. Switch heater OFF while refueling vehicle. Switch heater OFF BEFORE entering fueling stations.

To Prevent Burning: NEVER Touch hot components of the heating system.

The heater requires no periodic maintenance other than a visual inspection preferably prior to the heating season, ensure the heater and all components are free from damage and in proper working condition.

During the warmer months of the year when heating is not required, the heater should be switched ON and allowed to run for 5 to 10 minutes once a month as a minimum. This will keep a clean fresh supply of fuel in the heater fuel system and keep all moving parts in top operation condition.

The fuel fired auxiliary heater is used to preheat water-cooled vehicle engines.

The heater designed to the evaporator principle operates intermittently controlled by the temperature sensor.

In order to minimize the battery's workload the heater switches from full-load operation to part-load operation after reaching a water temperature of 72°C (161.6°F). In this mode of operation the heater operates with extremely low noise and particularly low power and fuel consumption.

The heater consists of the combustion air fan assembly, the control unit/heat exchanger, the burner insert, the combustion chamber, and a additional circulation pump.

Control Unit/Heat Exchanger

The control unit/heat exchanger includes:

- Control unit
- Temperature Sensor
- Overheat Protection
- Heat Exchanger
- Circulation Pump

Caution: The control unit/heat exchanger and the burner housing represent an assembly and must not be disassembled.

Control Unit

The control unit is the centre unit and ensures control and monitoring of combustion operation.

The control unit is ventilated by means of a ventilation hose routed from the combustion air collector compartment of the burner.

Temperature Sensor

The temperature sensor senses the coolant temperature in the heat exchanger of the heater as an electrical resistance. This signal is routed to the control unit for processing.

Overheat Protection

Overheat protection, controlled by a temperature resistor, protects the heater against undue operating temperatures. Overheat protection responds at water temperature in excess of 105°C (221°F) and switches the heater OFF.

Heat Exchanger

The heat exchanger transfers the heat generated by combustion to the coolant circuit.

Coolant Circulation Pump

The circulation pump ensures circulation of the coolant within the vehicle and heater coolant circuit. The pump is activated by the control unit and is in continuous operation.

Fuel Pump

The fuel pump is a combined delivery, dosing and shutoff system for the fuel supply of the heater out of the vehicle fuel tank.

Engine Electrical

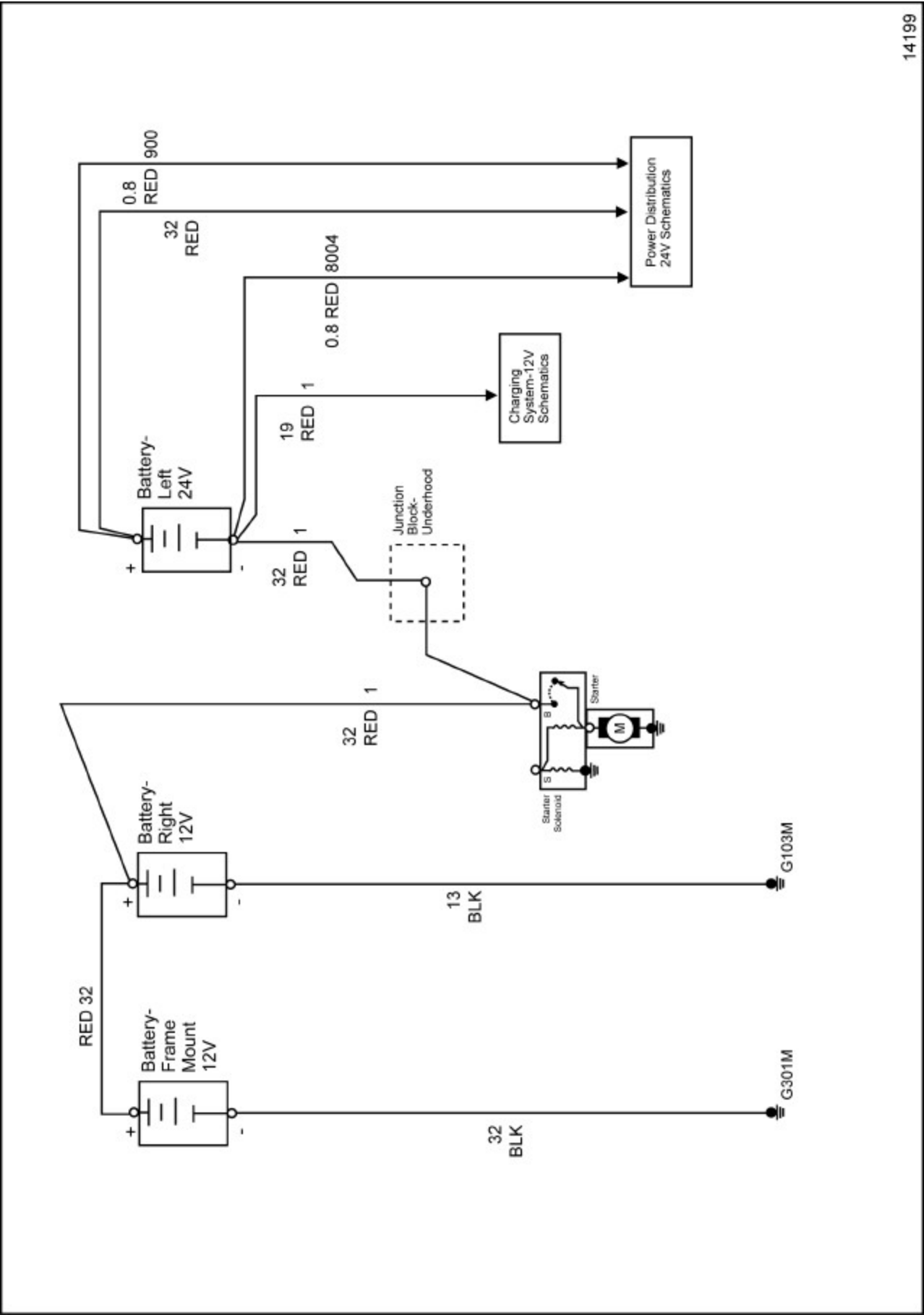
Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Battery Cable Connections	17 N•m	13 lb ft
Battery Retainer Bolt	25 N•m	18 lb ft
Circuit Breaker Bracket Bolts	6 N•m	53 lb ft
Generator Mounting Bolts	50 N•m	37 lb ft
Generator Output Stud Nut	9 N•m	80 lb in

Schematic and Routing Diagrams

Battery Schematic



Generator
Field
Indicator
Duty Cycle
Control
Signal

Engine Control Module (ECM)
COIN ID
C1-80 BLU
C2-60 CLR

15 52 C2
0.8 BRN 25
0.8 GRY 25
19 RED
8 RED
13 RED
32 RED
32 BLK
13 BLK
G301M
G103M

Generator-12V Left
Solid State Regulator
Field Rotor (Solid State)
Regulator (Solid State)
Rectifier Bridge
BATT

Battery Left 24V
+
-
Junction Block-Underhood

Battery Right 12V
Battery Frame Mount 12V

Starter Solenoid
S
B
M
Starter

Battery Equalizer Schematics

12V Circuit Breaker

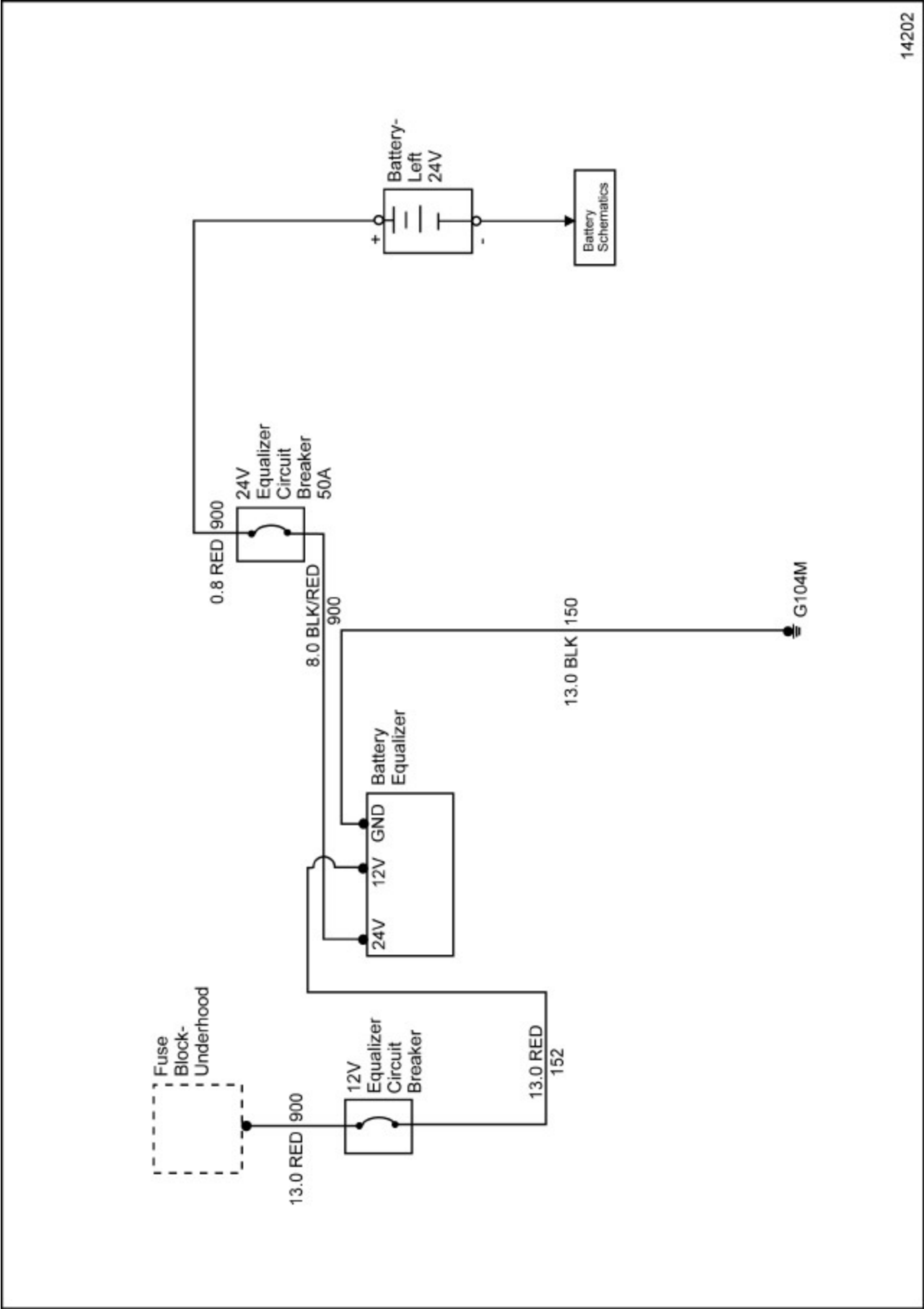
Fuse Link
19 RED 1
8 RED 1
13 RED 152
13 RED 1

The diagram illustrates a 24V electrical system with the following components and connections:

- Battery-Left 24V:** Connected to the main power line via a 0.8 RED wire (900).
- 24V Circuit Breakers:** Connected to the main power line via a 0.8 RED wire (900).
- NATO Slave Start:** Connected to the main power line via a 19 RED wire (1).
- Charging System-12V Schematics:** Connected to the main power line via a 32 RED wire (1).
- 24V Fuse 25A:** Located on the main power line, with terminals A and B.
- 24V Future Use:** Connected to the main power line via a 2.0 RED/BLK wire (8009).
- Relay-Block-I/P:** Connected to the main power line via a 0.8 BLK wire (150).
- Relay-Block-Underhood:** Connected to the main power line via a 0.8 BLK wire (150).
- Relay-24V:** Connected to the main power line via an 8.0 PNK wire (8002).
- Generator-24V-Left:** Connected to the main power line via an 8.0 YEL wire (8014).
- Generator-24V-Left:** Includes a Rectifier Bridge, Solid State Regulator, and Regulator (Solid State).
- 24V Trailer Fuse 25A:** Located on the main power line, with terminals A and B.
- 24V Trailer Connector:** Connected to the main power line via a 2.0 RED/WHIT wire (802).
- 24V Gauge:** Connected to the main power line via a 0.8 BLK wire (150).
- Grounding:** The system is grounded at the bottom right via a G101M terminal.

The diagram uses a color-coded wire system with gauges (e.g., 0.8, 2.0, 8.0) and alphanumeric labels (e.g., 8009, 8008, 8004, 8002, 8014, 802, 150, 900, 1) to identify specific wires and components.

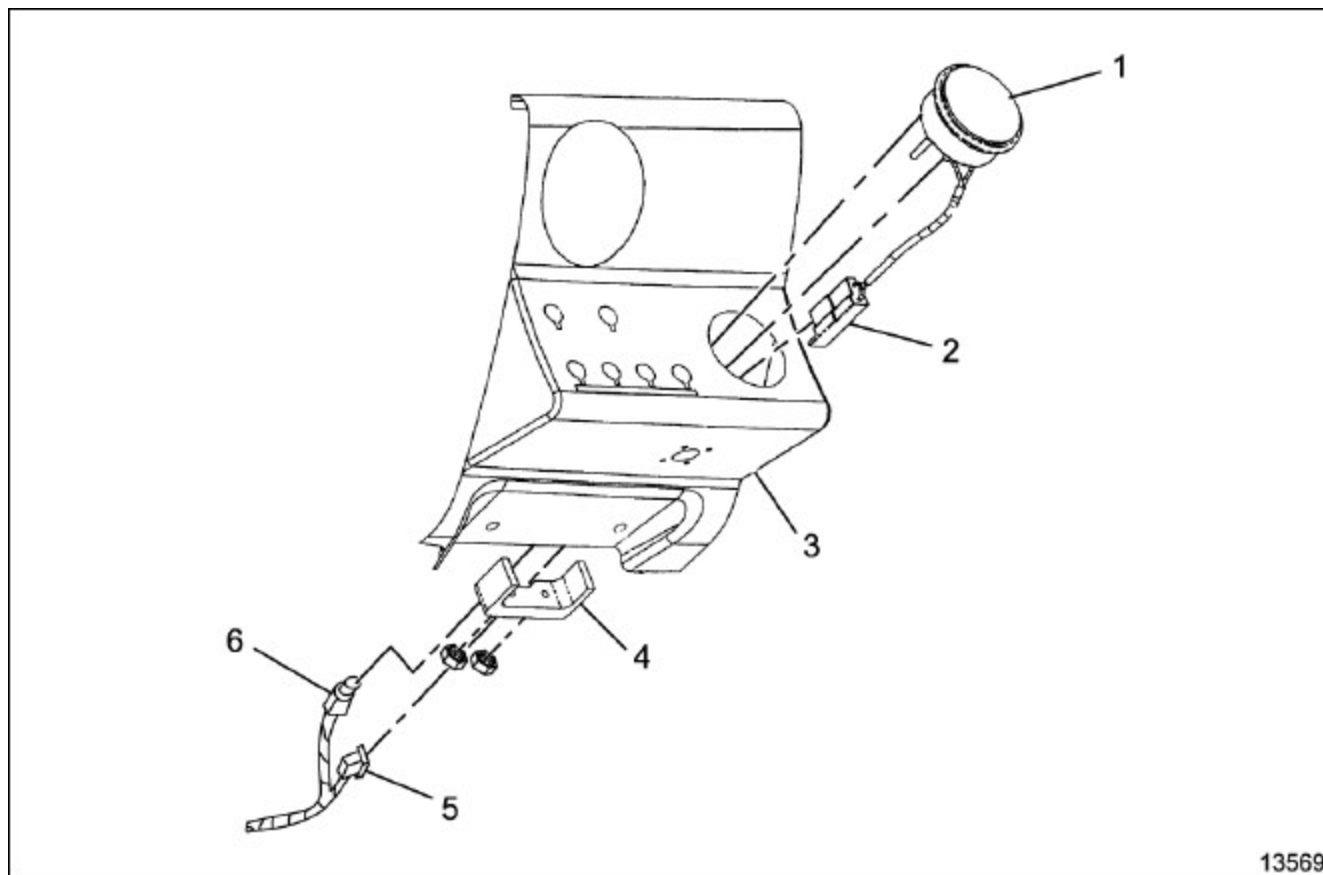
Battery Equalizer Schematics



Component Locator

Starting and Charging Component Views

Voltmeter and Lamp



13569

Legend

(1) Voltmeter (24V)

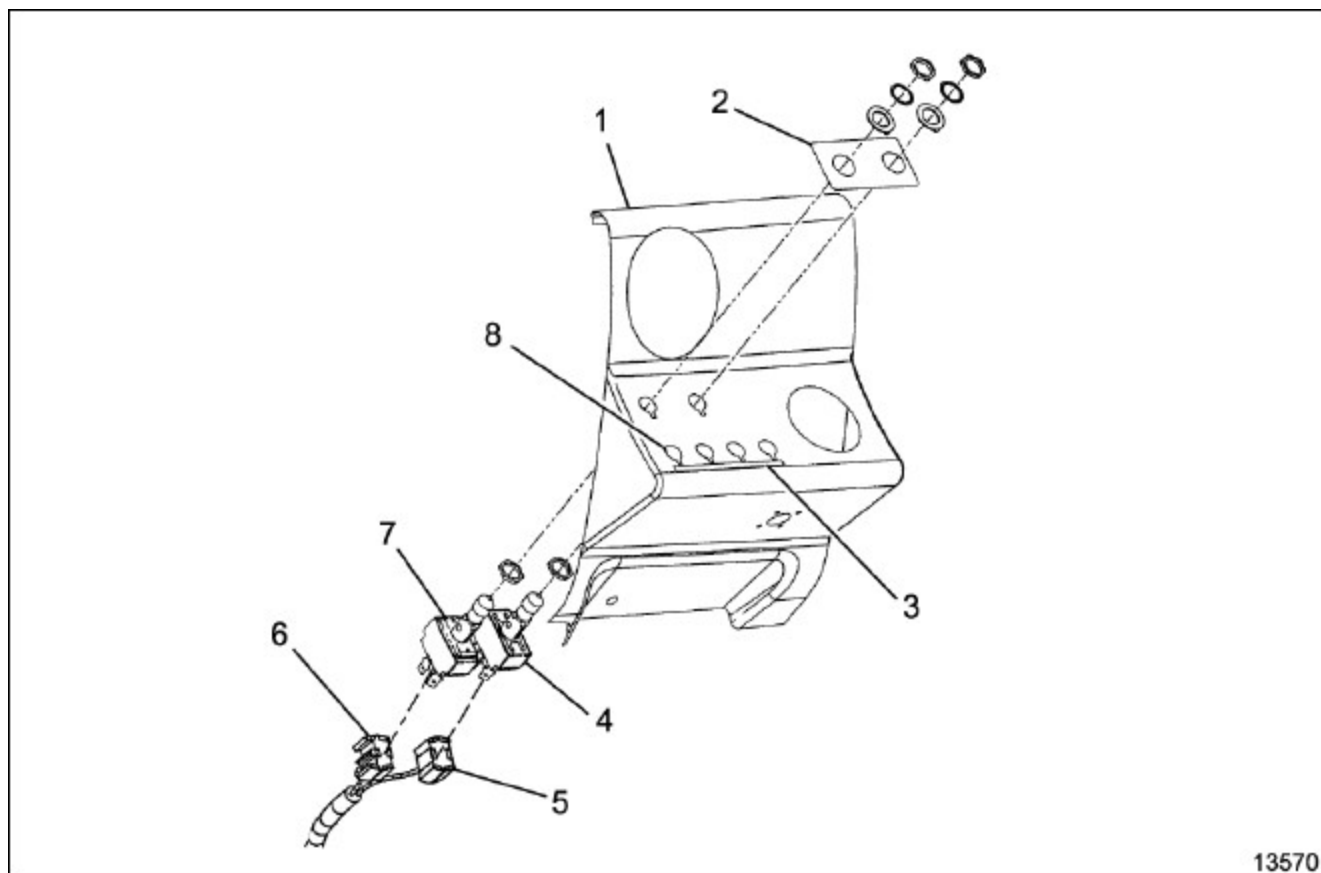
(2) Voltmeter Connector

(3) Mounting Bracket

(4) Voltmeter Bracket

(5) Harness Connector

(6) Voltmeter Illumination Bulb

Blackout (B/O) Lamp Switches**Legend**

(1) Mounting Bracket

(2) Switch Position Label

(3) Accessory Switch Label

(4) Blackout (B/O) Control Switch

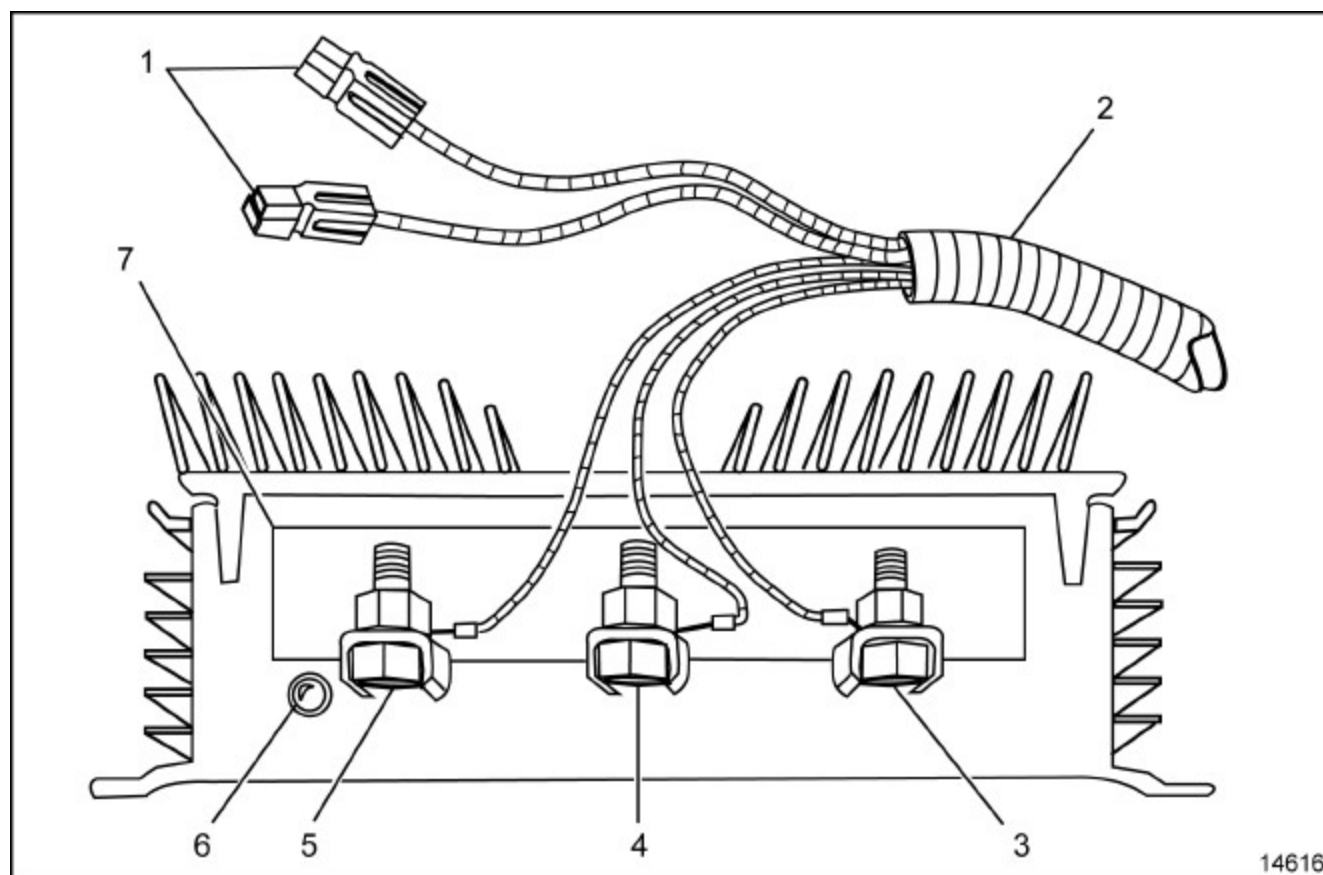
(5) Component Connector

(6) Component Connector

(7) Blackout (B/O) Drive Lamp Switch

(8) Accessory Switch Openings

Battery Equalizer

**Legend**

(1) To Power Distribution Box Harness

(2) Battery Equalizer Harness

(3) Ground Connection (Black Wire)

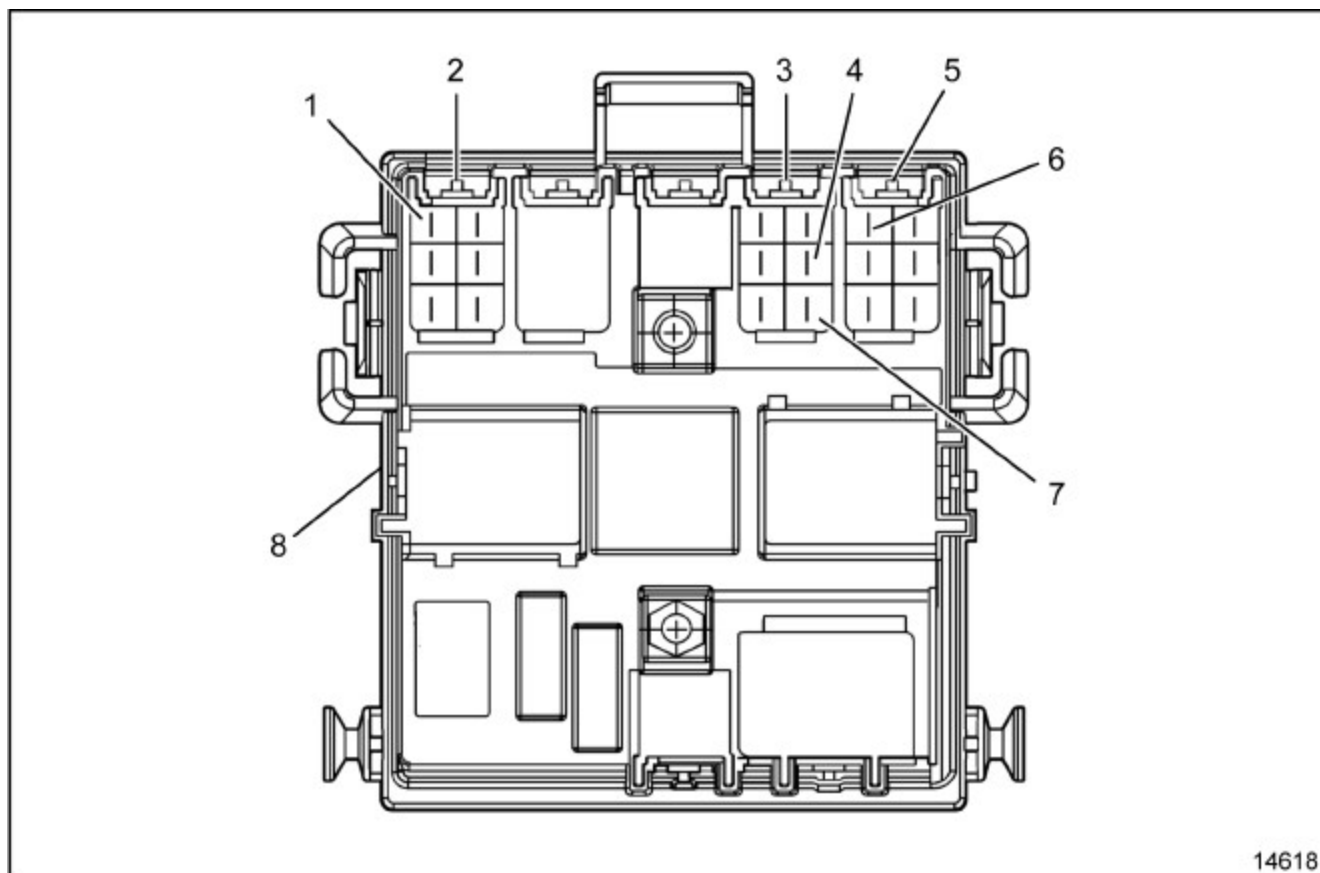
(4) 12V Connection (Red Wire)

(5) 24V Connection (Black/Red Wire)

(6) LED Status Indicator

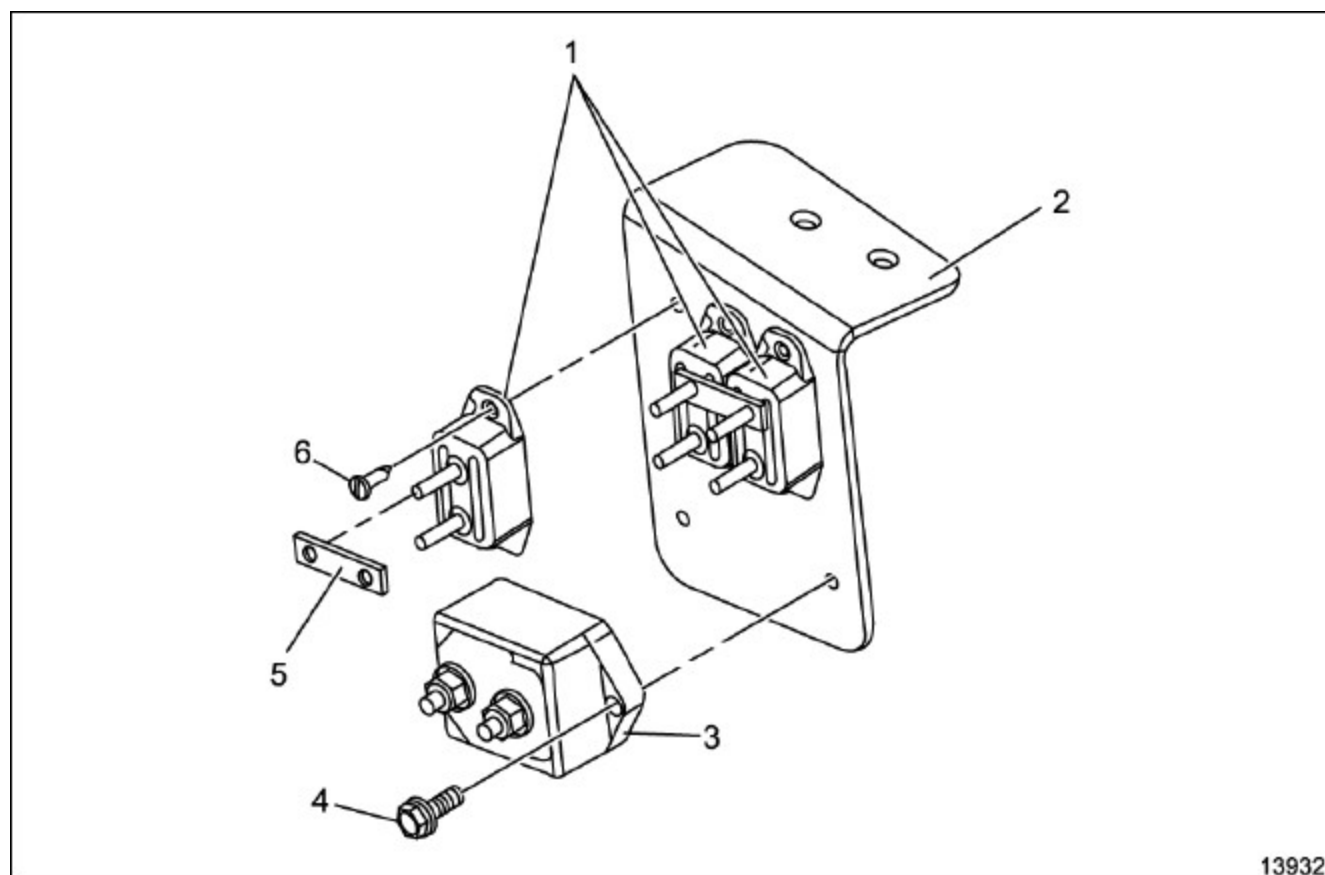
(7) Battery Equalizer

Relay Block – IP

**Legend**

- | | |
|--------------------------------------|-------------------------------|
| (1) Cavity C – Blackout (B/O) Switch | (5) C4 – Connector Location |
| (2) C8 – Connector Location | (6) Cavity D – MAP/Receptacle |
| (3) C5 – Connector Location | (7) Cavity F – 24V Meter |
| (4) Cavity E – 24V Meter Ground | (8) Relay Block – I/P |

12V and 24V Circuit Breakers



13932

Legend

(1) 50 amp 24V Circuit Breakers

(2) Circuit Breaker Bracket

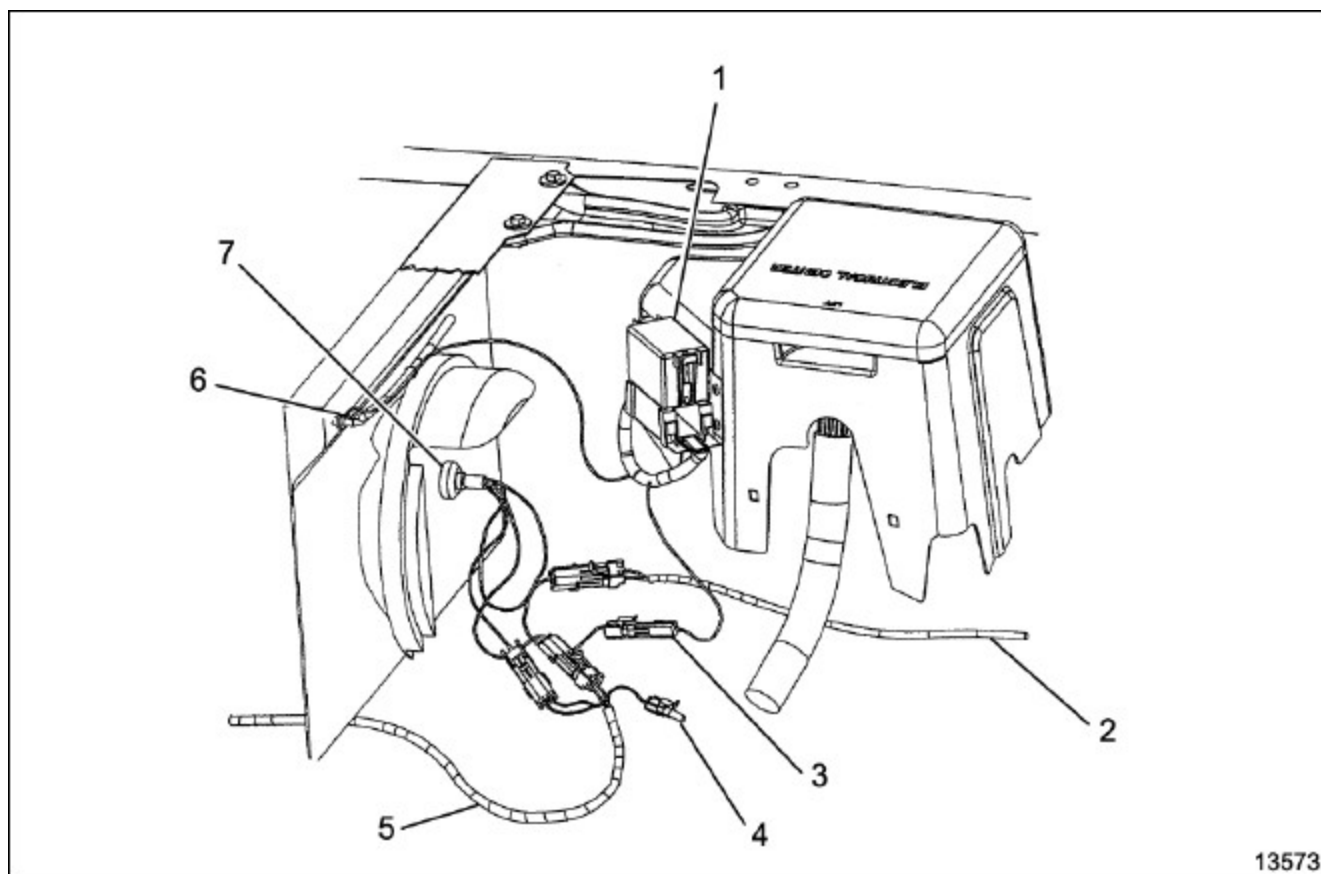
(3) 120 amp 12V Circuit Breaker

(4) Bolt

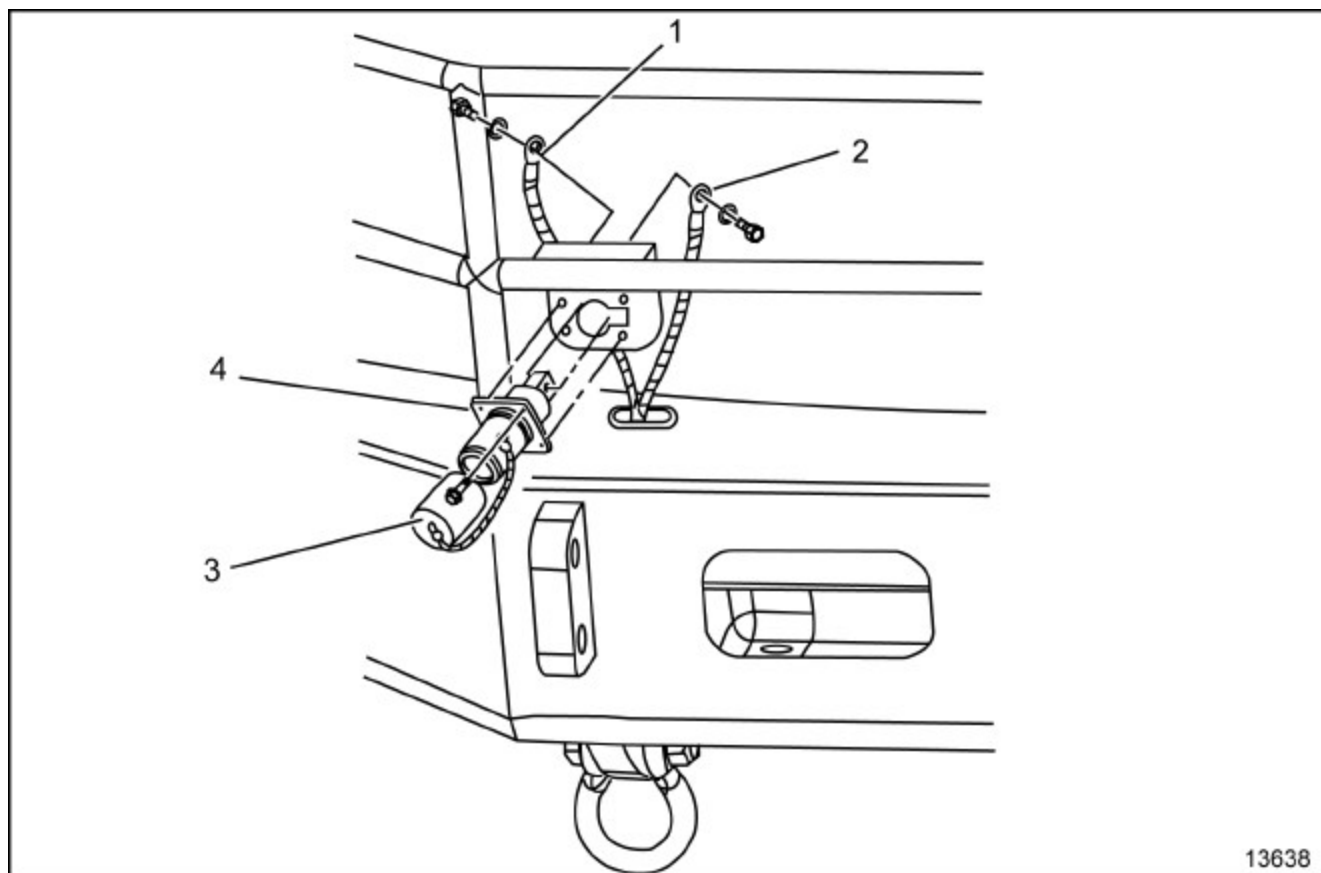
(5) Buss Bar

(6) Bolt 1/2 20 x 0.75

Underhood Wiring

**Legend**

- | | |
|-----------------------------------|----------------------------------|
| (1) Interrupt Relays | (5) To Rear Extension Harness |
| (2) To Front Blackout (B/O) Lamps | (6) Ground Stud |
| (3) To Ground Stud | (7) Blackout (B/O) Panel Harness |
| (4) To Engine Harness | |

24V Slave Receptacle Assembly**Legend**

(1) Battery Negative Ground (Black)

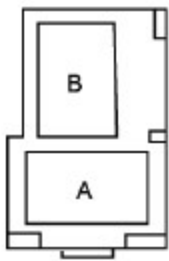
(3) Slave Receptacle Cover

(2) Battery Positive Ground (Red)


(4) Slave Receptacle

Starting and Charging Connector End Views

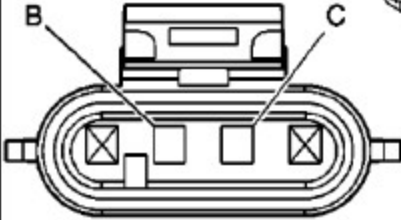
Voltmeter Connector

 <p style="text-align: right;">10547</p>			
Connector Part Information		<ul style="list-style-type: none"> • 02973781 • 2-Way Series 280 (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BRN	8008	Voltmeter Feed
B	BLK	150	Ground

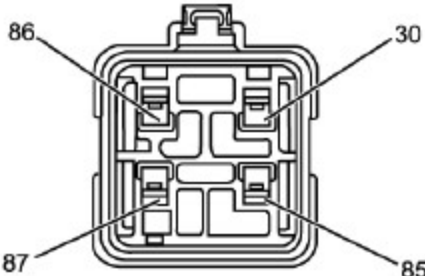
Voltmeter Lamp

 <p style="text-align: right;">7927</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12004264 • 2F LP SOC Hardshell (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BRN	9	Voltmeter Feed
B	BLK	150	Ground

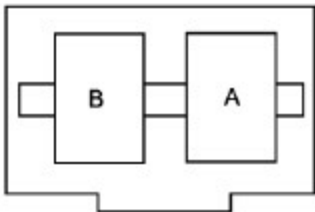
Generator Connector

 <p style="text-align: right;">7862</p>			
Connector Part Information		<ul style="list-style-type: none"> • 15355066 • 4-Way F Metri-Pack 150 Series Sealed (NAT) 	
Pin	Wire Colour	Circuit No.	Function
A	—	—	Not Used
B	YEL	8014	Generator Field Duty Cycle Signal
C-D	—	—	Not Used

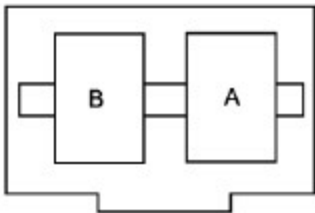
24 V Generator Relay

 <p style="text-align: right;">10550</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12129716 • 4-Way F MP Series 280 (GRY) 	
Pin	Wire Colour	Circuit No.	Function
30	BRN	8008	Operator Field Duty Cycle Signal
85	PNK	8002	UBEC Cavity A3
86	BLK	150	Ground
87	RED/BLK	8009	24 V Battery Voltage

24 V Trailer Fuse

			
Connector Part Information		<ul style="list-style-type: none"> • 12010105 • 2-Way F Auto Fuse Holder 	
Pin	Wire Colour	Circuit No.	Function
A	RED/BLK	8009	24 V Battery Voltage
B	RED/WHT	802	Trailer Connector Supply Voltage

24 V Auxiliary Fuse

			
Connector Part Information		<ul style="list-style-type: none"> • 12010105 • 2-Way F Auto Fuse Holder 	
Pin	Wire Colour	Circuit No.	Function
A	RED/BLK	8009	24 V Battery Voltage
B	RED/BLK	8009	24 V Feed (Not Used)

Diagnostic Information and Procedures

Symptom List

Note: For vehicle no start condition, refer to Diagnostic System Check in Engine Controls – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Wheeled Vehicle (LUVW).

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Voltmeter Lamp Inoperative
- Battery Equalizer Inoperative
- Voltmeter Inoperative
- 24V Generator Noise Diagnosis
- 24V Generator Inoperative
- Battery Inspection Test

Voltmeter Lamp Inoperative

Step	Action	Yes	No
Schematic Reference: Engine Electrical			
1	Did you review the Charging System Description and Operation?	Go to Step 2	Go to Description and Operation
2	Connect a test lamp between cavity A of the voltmeter bulb and ground. Does the test lamp illuminate?	Go to Step 3	Go to Step 4
3	Connect a self-powered test lamp to cavity B and ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 6
4	Locate and repair the open or high resistance in circuit 9. Did you complete the repair?	Go to Step 7	—
5	Replace the voltmeter bulb. Did you complete the replacement?	Go to Step 7	—
6	Locate and repair the open or high resistance in 150. Did you complete the repair?	Go to Step 7	—
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Battery Equalizer Inoperative

Diagnostic Aids

If the +12V voltage is normal and the STATUS INDICATOR is OFF the batteries are equalized and the equalizer is waiting for a 12V load, turn ON a 12V load and the STATUS INDICATOR should turn ON. If it does there is no problem with equalizer.

Battery Equalizer Inoperative

Step	Action	Yes	No
1	Did you review the Charging System Description and Operation?	Go to Step 2	Go to Description and Operation
2	Connect a test lamp between the 12V terminal of the equalizer and ground. Does the test lamp illuminate?	Go to Step 3	Go to Step 4
3	Connect a test lamp between the 24V terminal and ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 5
4	Connect a test lamp between the output side of the 12V circuit breaker and ground. Does the test lamp illuminate?	Go to Step 8	Go to Step 9
5	Connect a test lamp between the output side of the 24V circuit breaker and ground. Does the test lamp illuminate?	Go to Step 11	Refer to Step 9
6	Connect a self-powered test lamp to the ground terminal and ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 13
7	Replace the battery equalizer. Did you complete the replacement?	Go to Step 14	—
8	Locate and repair the open or high resistance in circuit 152. Did you complete the repair?	Go to Step 14	—
9	Connect a test lamp on the input side of the circuit breaker and ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 12
10	Locate the source of the overload and replace the circuit breaker. Did you complete the repair?	Go to Step 14	—
11	Locate and repair the open or high resistance in circuit 900 between the equalizer and the circuit breaker. Did you complete the repair?	Go to Step 14	—
12	Locate and repair the open or high resistance in the power feed circuit. Did you complete the repair?	Go to Step 14	—
13	Locate and repair the open or high resistance in circuit 150. Did you complete the repair?	Go to Step 14	—
14	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Voltmeter Inoperative**Diagnostic Aids**

The 24V Battery must be fully charged before testing the voltmeter for proper operation. Refer to Battery Inspection/Test (24V).

Voltmeter Inoperative

Step	Action	Yes	No
Schematic Reference: Engine Electrical			
1	Did you review the Charging System Description and Operation?	Go to Step 2	Go to Description and Operation
2	Connect a test lamp between cavity A of the voltmeter and ground. Note: Vehicle must be running for the following steps. Does the test lamp illuminate?	Go to Step 3	Go to Step 4
3	Connect a test lamp between cavity B of the voltmeter and ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 6
4	Connect a test lamp between cavity 30 of the voltmeter relay and ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 8
5	Locate and repair the open in circuit 150. Did you complete the repair?	Go to Step 15	—
6	Replace the voltmeter. Did you complete the repair?	Go to Step 15	—
7	Locate and repair the open or high resistance in circuit 8008. Did you complete the repair?	Go to Step 15	—
8	Connect a test lamp between cavity 87 and ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 9
9	Locate and repair the open or high resistance in circuit 8009. Did you find and correct the condition?	Go to Step 15	Go to 24V Generator Inoperative
10	Connect a test lamp between cavity 85 of the voltmeter relay and ground. Does the test lamp illuminate?	Go to Step 11	Go to Step 14
11	Connect a test lamp between cavity 86 and ground. Does the test lamp illuminate?	Go to Step 13	Go to Step 12
12	Replace the voltmeter relay. Did you complete the replacement?	Go to Step 15	—
13	Locate or repair the open or high resistance in circuit 150. Did you complete the repair?	Go to Step 15	—
14	Locate and repair the open or high resistance in circuit 8002. Did you complete the repair?	Go to Step 15	—
15	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

24V Generator Noise Diagnosis

Diagnostic Aids

Noise from a generator may be due to electrical or mechanical noise. Electrical noise, magnetic whine usually varies with the electrical load placed on the generator and is a normal operating characteristic of all generators. When diagnosing a noisy generator, it is important to remember that loose or misaligned components around the generator may transmit the noise into the passenger compartment and that replacing the generator may not solve the problem.

24V Generator Noise Diagnosis

Step	Action	Yes	No
1	Test the generator for proper operation using the generator tester. Refer to Charging System Test in Engine Electrical in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW). Is the generator operating properly?	Go to Step 2	Go to Step 10
2	1. Start the engine. Verify that the noise can be heard. 2. Turn OFF the engine. 3. Disconnect the 4-way connector from the generator. 4. Start the engine. 5. Listen for the noise. Has the noise stopped?	Go to Step 10	Go to Step 3
3	1. Turn OFF the engine. 2. Remove the drive belt. Refer to Drive Belt Replacement in Engine Mechanical 6.6 L in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW). 3. Spin the generator pulley by hand. Does the generator shaft spin smoothly and without any roughness or grinding noise?	Go to Step 4	Go to Step 10
4	Inspect the generator for a loose pulley and/or pulley nut. Is the generator pulley or pulley nut loose?	Go to Step 10	Go to Step 5
5	Inspect the generator for the following conditions: <ul style="list-style-type: none"> Strained or stretched electrical connections. Hoses or other vehicle equipment resting on the generator, which may cause the noise to be transmitted into the passenger compartment. Are any electrical connections pulling on the generator or are any hoses, etc. resting on the generator?	Go to Step 6	Go to Step 7
6	1. Reroute the electrical connections to relieve the tension. 2. Reroute the hoses, etc. away from the generator. 3. Start the engine. Has the noise decreased or stopped?	System OK	Go to Step 7
7	Inspect the drive belt for proper tension. Refer to Drive Belt Tensioner Diagnosis in Engine Mechanical 6.6 L in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW). Is the drive belt loose?	Go to Step 8	Go to Step 9

24V Generator Noise Diagnosis (cont'd)

Step	Action	Yes	No
8	1. Replace the drive belt tensioner. Refer to Drive Belt Tensioner Replacement in Engine Mechanical – 6.6L in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW). 2. Start the engine. Has the noise decreased or stopped?	System OK	Go to Step 10
9	Compare the vehicle with a known good vehicle. Do both vehicles make the same noise?	System OK	Go to Step 10
10	Important: If no definite generator problems were found, be sure that all other possible sources of objectionable noise are eliminated before replacing the generator. Replacing the generator may not change the noise level if the noise is a normal characteristic of the generator or the generator mounting. Replace the generator. Refer to 24V Generator Replacement. Has the noise decreased or stopped?	Go to Step 11	—
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

24V Generator Inoperative

Step	Action	Value(s)	Yes	No
Schematic Reference: Engine Electrical				
1	Did you review the Charging System Description and Operation?	—	Go to Step 2	Go to Description and Operation
2	Using a DMM, measure the voltage across the 24V battery terminals. Is the voltage between the specified voltage?	18.0-28.5V	Go to Step 3	Go to Battery Inspection Test (24V)
3	1. Start the engine. 2. Using a DMM, measure the voltage between the generator terminal B and ground. Is the voltage greater than the specified value?	7V	Go to Step 4	Go to Step 6
4	Using a DMM, measure the voltage from the BATT terminal and ground. Is the voltage greater than the specified voltage?	7V	Go to Step 5	Go to Step 7
5	Connect a test lamp between ground terminal of the generator and battery negative. Does the test lamp illuminate?	—	Go to Step 8	Go to Step 10
6	Connect a test lamp between terminal 30 of the 24V relay and ground. Does the test lamp illuminate?	—	Go to Step 9	Go to Step 11

24V Generator Inoperative (cont'd)

Step	Action	Value(s)	Yes	No
7	Repair the generator voltage circuit for an open or high resistance. Did you complete the repair?	—	Go to Step 17	—
8	Test the generator ground circuit for an open or high resistance. Did you find and correct the condition?	—	Go to Step 17	Go to Step 10
9	Repair the generator field circuit for an open or high resistance. Did you complete the repair?	—	Go to Step 17	—
10	Replace the generator. Refer to 24V Generator Replacement. Did you complete the replacement?	—	Go to Step 17	—
11	Connect a test lamp between terminal 85 and ground. Did the test lamp illuminate?	—	Go to Step 12	Go to Step 14
12	Connect a test lamp between terminal 86 and ground. Did the test lamp illuminate?	—	Go to Step 16	Go to Step 14
13	Repair the 24V relay control voltage circuit for an open or high resistance. Did you complete the repair?	—	Go to Step 17	—
14	Connect a test lamp between terminal 87 of the 24V relay and ground. Did the test lamp illuminate?	—	Go to Step 15	Go to Step 13
15	Replace the 24V relay. Refer to Relay Replacement – 24V Generator. Did you complete the replacement?	—	Go to Step 17	—
16	Repair the 24V relay ground control circuit for an open or high resistance. Did you complete the repair?	—	Go to Step 17	—
17	Operate the system in order to verify the repair. Did you correct the condition?	—	System OK	Go to Step 2

Battery Inspection/Test (24V)

For testing the dual batteries or 24V battery use Out of Vehicle test for each battery. Refer to Battery Inspection/Test in Engine Electrical in C-31-Q44-000/MN-001.

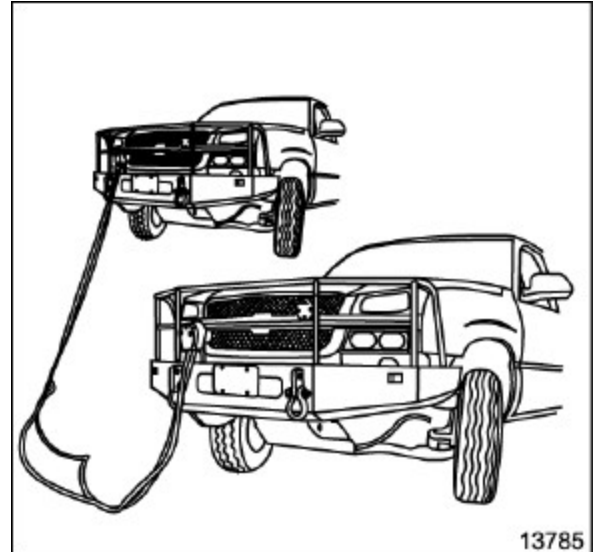
Repair Instructions

Jump Starting in Case of Emergency

If the battery (or batteries) on the vehicle has run down and the vehicle will not start, you may want to use another vehicle to provide power to start the vehicle.

The NATO term for this system is Slave receptacle. In the event the system must be replaced, refer to Slave Receptacle Replacement in Bumpers.

NATO Slave Cables are the only recommended method of jump starting similar vehicles.



Slave Starting

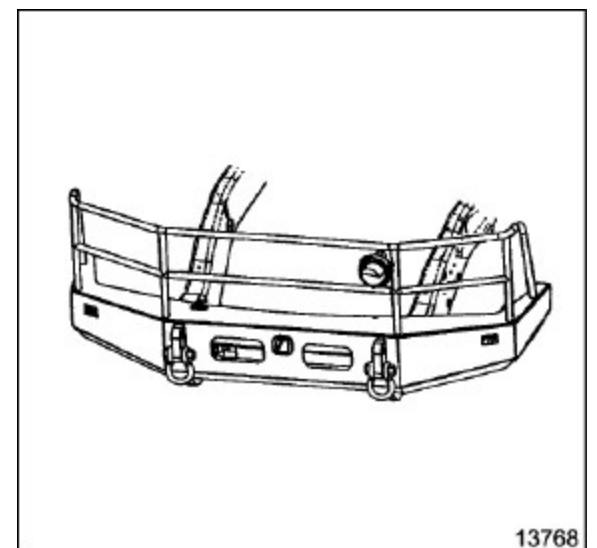
Caution: Batteries can hurt you. They can be dangerous because they contain acid that can burn you. They contain gas that can explode or ignite. They contain enough electricity to burn you. If you don't follow these steps exactly some or all of these things can hurt you.

Notice: Ignoring these steps could result in costly damage to the vehicle. Trying to start your vehicle by pushing or pulling it won't work and it could damage your vehicle.

You should always use the NATO Slave Receptacle and Slave Cable when performing this operation.

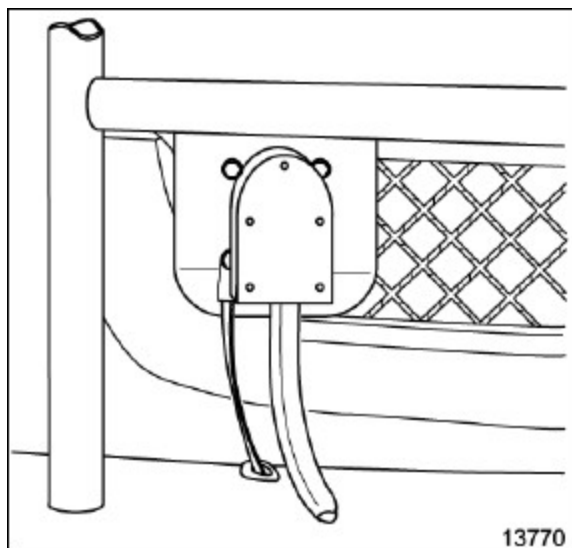


1. Position the vehicles close enough so the slave cable can reach, but be sure the vehicles are not touching each other. If they are, it could cause a ground connection you don't want. You would not be able to start your vehicle, and the bad grounding could damage the electrical systems. To avoid the possibility of the vehicles rolling, set the parking brake firmly on both vehicles involved in the jump start procedure. Put the automatic transmission in PARK (P). Be sure the transfer case is not in NEUTRAL (N).
2. Turn OFF the ignition on both vehicles. Unplug unnecessary accessories plugged into the cigarette lighter or accessory power outlets. Turn OFF all lamps that aren't needed as well as radios. This will avoid sparks and help save both batteries.
3. Locate the slave receptacles on both vehicles.



Caution: Using a open frame near a battery can cause battery gas to explode. People have been hurt doing this, and some have been blinded. Use a flashlight if you need more light. Be sure the batteries have enough water. You don't need to add water to the Delco Freedom[®] battery (or batteries) installed in every new GM vehicle. But if a battery has filler caps, be sure the right amount of fluid is there. If it is low add water to take care of that first. If you don't explosive gas could be present. Don't get it on you. If you accidentally get it in your eyes or on your skin, flush the place with water and get medical help immediately.

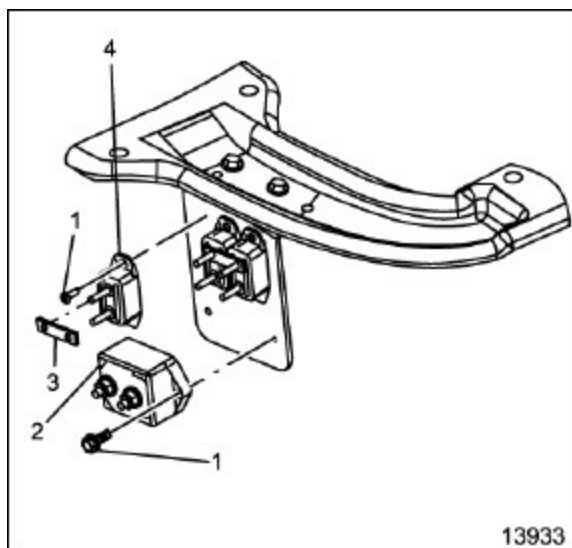
Caution: Fans or other moving engine parts can injure you badly. Keep your hands away from moving parts once the engine is running.



4. Connect the slave cable to the vehicle with the dead battery.
5. Start the vehicle with the good batteries.
6. Connect the slave cable to the vehicle with the good battery.
7. Allow the vehicle with the dead battery to charge for 10 minutes.

Note: It may take up to 30 minutes to charge the battery depending on its state of charge.

8. Start the vehicle with the dead battery.
9. Remove the slave cable in the reverse order that it was installed. Take care not to let the cables touch a metal surface.



Circuit Breaker Replacement – 12V or 24V Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.
2. Remove nuts holding the wires to the circuit breaker and remove wires.

Note: Note location of wires for reassembly.

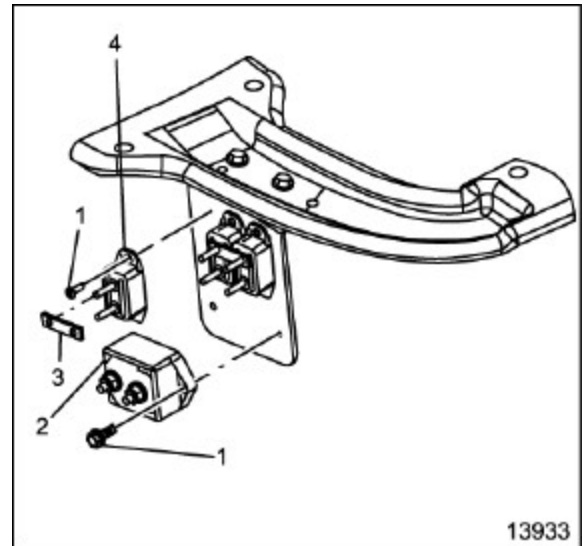
3. Remove the 2 bolts (1), holding the 12V (4) or 24V (2) circuit breaker to the fender support.
4. Remove the 12V (4) or 24V (2) circuit breaker.

Installation Procedure

1. Install the 12V (4) or 24V (2) circuit breaker to the fender support with the 2 bolts (1).

Note: Install 24V circuit breaker with auxiliary contact up.

2. Install the wires to the circuit breaker with the two nuts.
3. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.

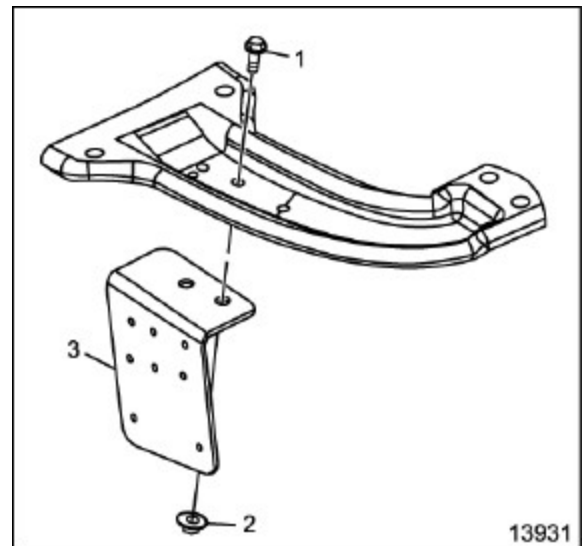


Circuit Breaker Bracket Replacement

Removal Procedure

Caution: Refer to Battery Disconnect Caution in Cautions and Notices.

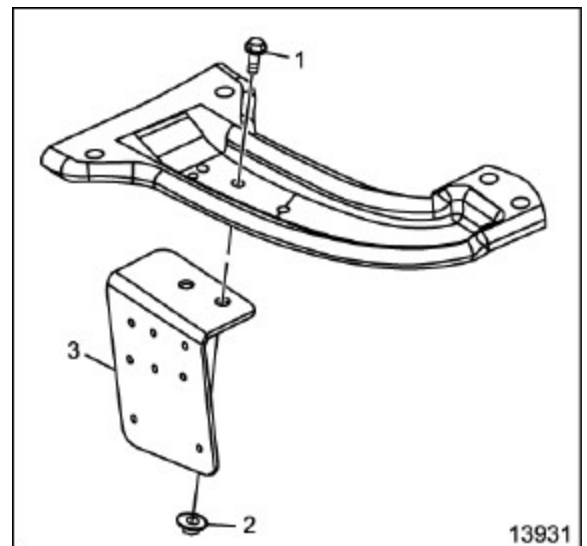
1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.
2. Remove the circuit breakers. Refer to Circuit Breaker Replacement – 12V or 24V.
3. Remove bolts (1) and nuts (2) attaching bracket (3) to fender/cowl support.

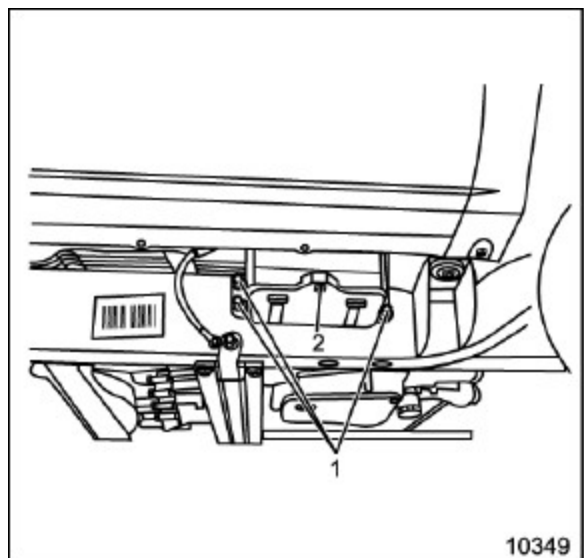


Installation Procedure

Notice: Refer to Fastener Notice in Cautions and Notices.

1. Install bracket (3) to fender/cowl and tighten bolts (1) and nuts (2).
Tighten
Tighten bracket bolts to 6 N•m (53 lb in).
2. Install circuit breakers. Refer to Circuit Breaker Replacement – 12V or 24V.
3. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.



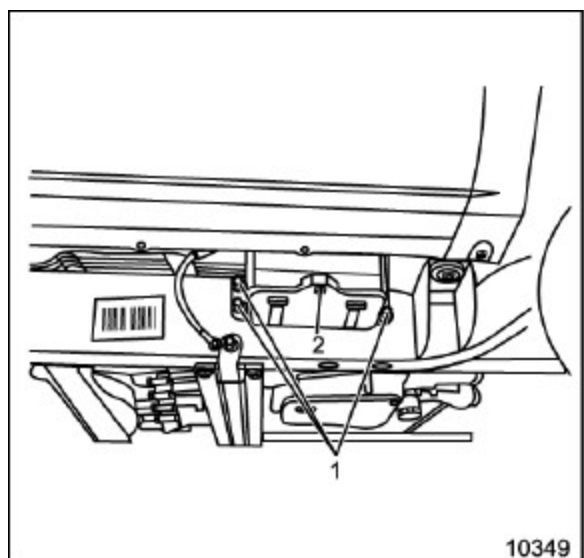


Battery Tray/Battery Replacement

Removal Procedure

Caution: Refer to Battery Disconnect Caution in Cautions and Notices.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.
2. Loosen bolts (1). Push up battery tray (2) and remove from frame.
3. Unsnap the positive battery cable cover.
4. Remove negative and positive battery cables.
5. Remove retainer bolt and remove battery.

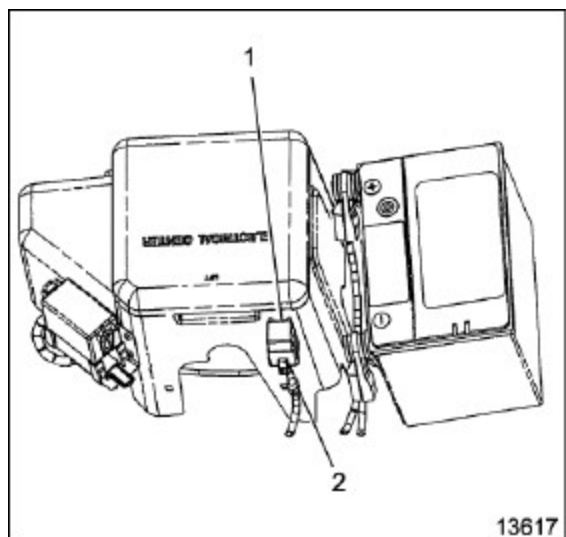


Installation Procedure

1. Install battery in tray.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install battery retainer and tighten bolt.
Tighten
Tighten retainer bolt to 25 N•m (18 lb ft).
3. Install positive and negative cables and tighten.
Tighten
Tighten cables to 17 N•m (13 lb ft).
4. Snap the positive battery cable cover closed.
5. Lift battery tray onto bolts on frame and tighten.
6. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.

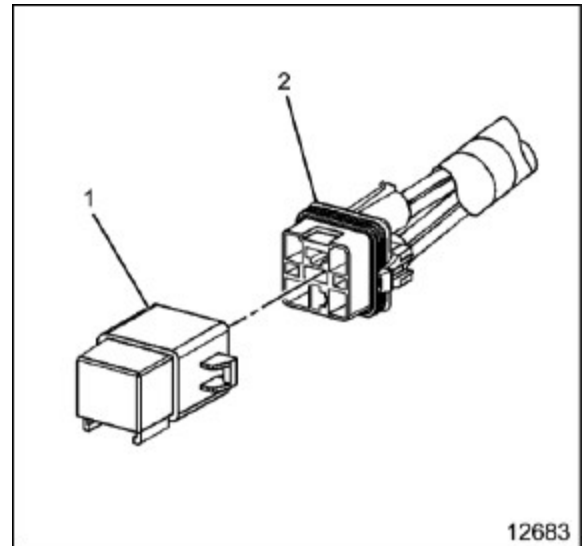


Relay Replacement – 24V Generator

Removal Procedure

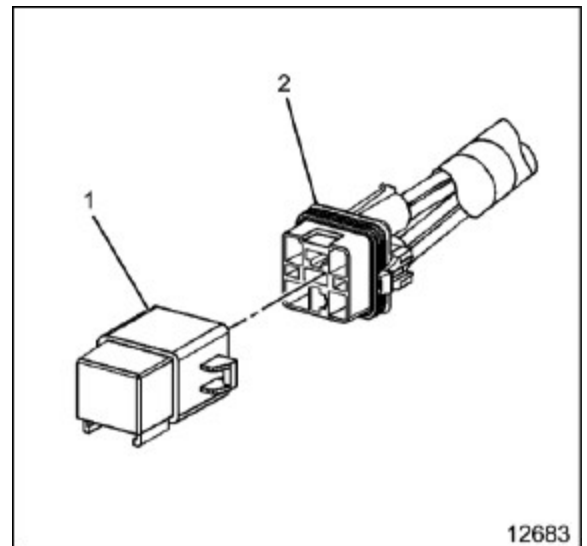
1. Release the clip (2) securing the wiring harness to the underhood electrical centre housing.
2. Remove the 24V relay (1) from the underhood electrical centre housing.

3. Remove the connector position assurance (CPA) devices or secondary locks.
4. Separate the relay (1) from the wiring harness connector (2).

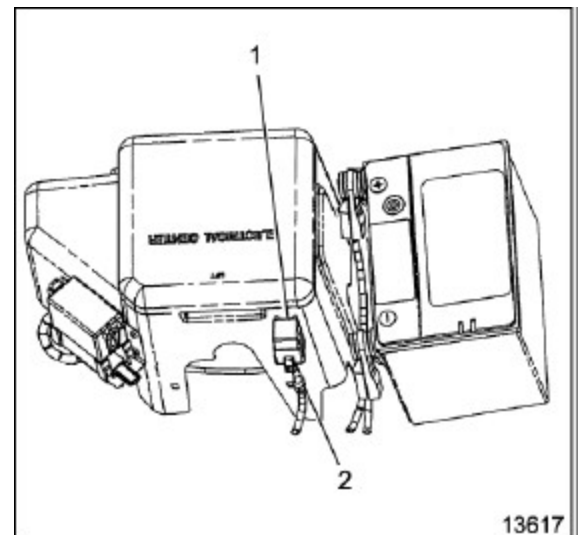


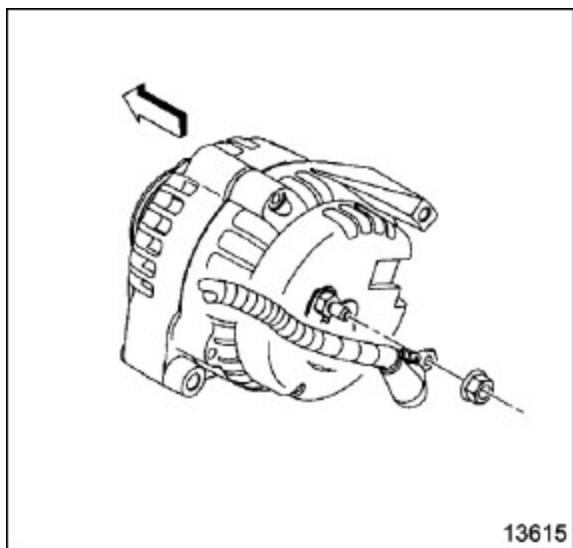
Installation Procedure

1. Connect the relay (1) to the wiring harness connector (2).
2. Install any connector position assurance (CPA) devices or secondary locks.



3. Install the 24V relay (1) onto the underhood junction block.
4. Secure the wiring harness to the clip (2).



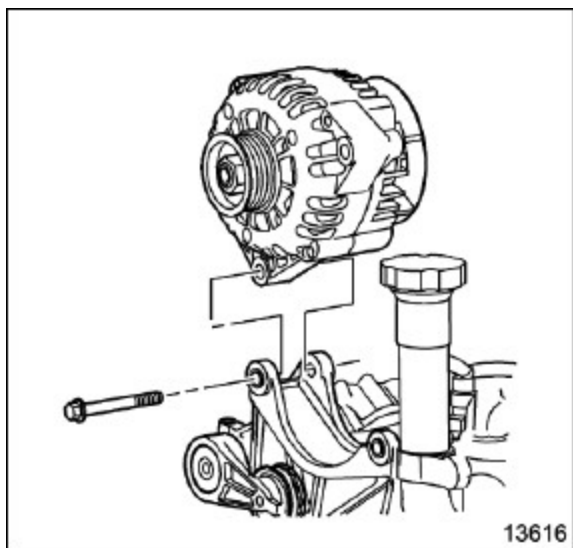


24V Generator Replacement

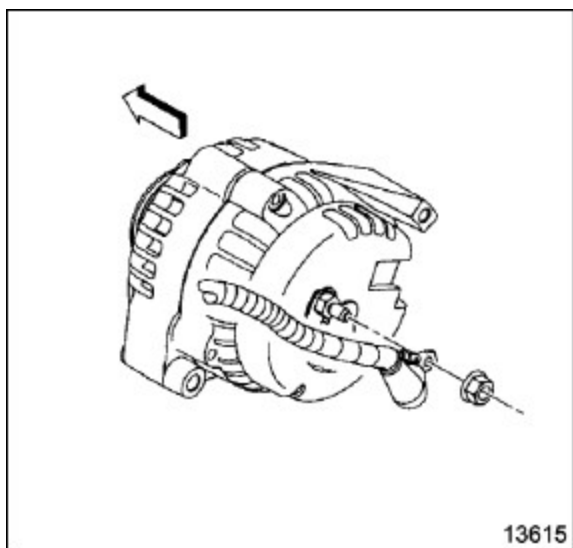
Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.
2. Remove the drive belt. Refer to Drive Belt Replacement in Engine Mechanical – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
3. Disconnect the generator electrical connector.
4. Remove the cable from the output stud.



5. Remove the generator bolts.
6. Remove the generator from the vehicle.



Installation Procedure

1. Install the cable onto the output stud of the generator.

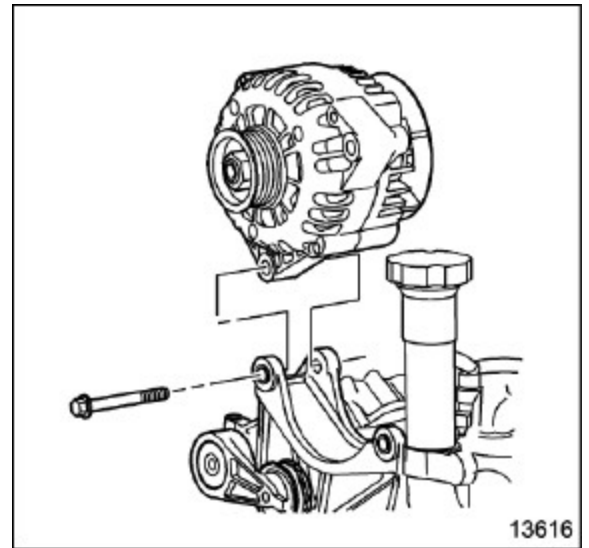
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the nut onto the output stud.

Tighten

Tighten output stud to 9 N•m (80 lb in).

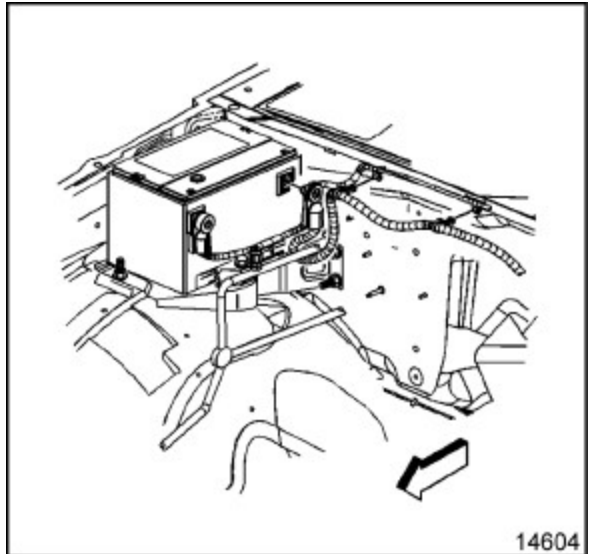
3. Install the generator into the mounting bracket.
4. Install the generator bolts.
Tighten
Tighten generator bolts to 50 N•m (37 lb ft).
5. Connect the generator electrical connector.
6. Install the drive belt. Refer to Drive Belt Replacement in Engine Mechanical – 6.6L in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
7. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure.



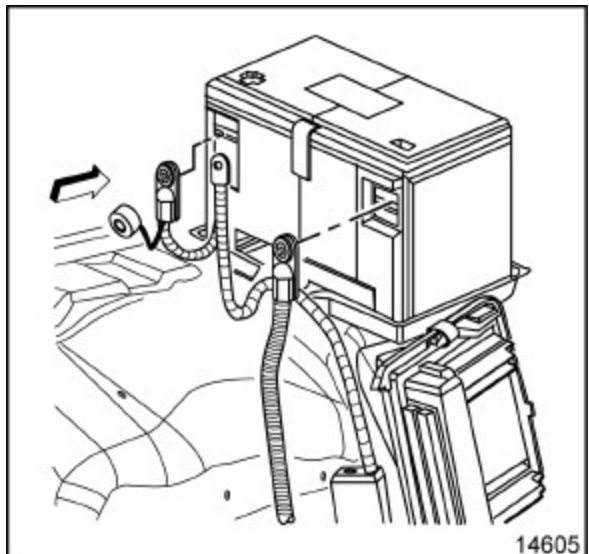
Battery Cable Disconnect/Connect Procedure

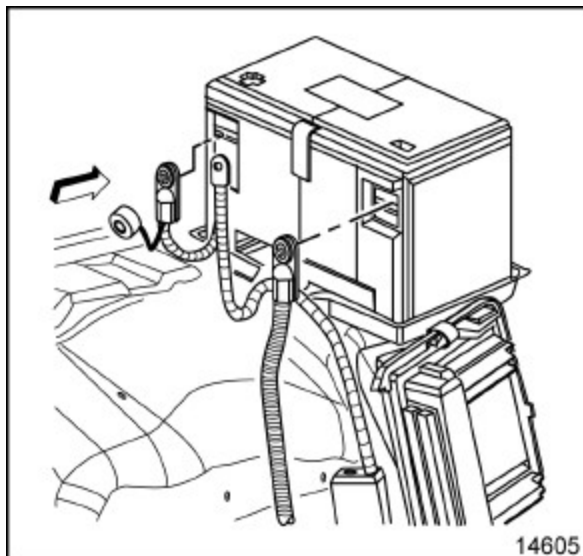
Removal Procedure

1. Turn OFF all the lamps and accessories.
2. Turn the ignition OFF.
3. Remove the negative cable from the frame mounted battery.
4. Remove the battery negative cable from the right underhood battery.



5. Remove the negative cable of the 24V battery.
6. Remove the positive cable of the 24V battery.





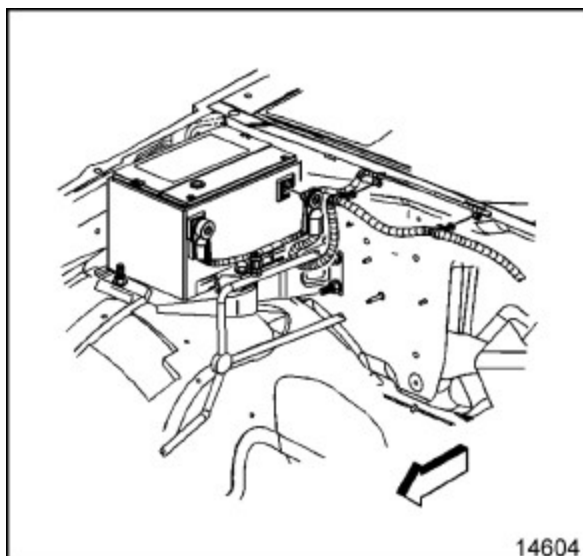
Installation Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

Notice: Refer to Fastener Notice in Cautions and Notices

Important: Clean any existing corrosion from the battery terminal bolt flange and the battery cable end.

1. Install the positive cable to the 24V battery.
2. Install the battery ground negative cable to the 24V battery.
Tighten
Tighten the bolt to 17 N•m (13 lb ft).
3. Install the negative battery cable to the right underhood battery.
Tighten
Tighten the bolt to 17 N•m (13 lb ft).



4. Install the negative cable of the frame mounted battery.
Tighten
Tighten the bolt to 17 N•m (13 lb ft).

Description and Operation

Battery Description (12V and 24V)

The engine electrical options include the slave receptacle, battery equalizer, and a three-battery power system.

The two batteries in series provide 24V of power, which is isolated by the power equalizer and controlled by the circuit breakers. These step the power down to 12V from 24V. Greater power is needed for the higher load used by optional radio communications, or for compatibility with other slave receptacles on other vehicles.

Refer to in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW) for further details. Refer to Replacement procedures in this manual for repairs on various electrical components.

Maintenance

The 24V power system makes each vehicle capable of accepting a power boost through its slave receptacle from any vehicle similarly equipped. This 24V system requires specific maintenance.

Note: Repairs in this manual are limited to the specific military equipment included in the LUVW options most commonly ordered.

Charging System Description and Circuit Operation

Charging

The LUVW vehicles are equipped with a 24V generator. The 24V generator's electronics are isolated from the chassis ground. The 24V configuration provides sufficient capacity and reserve for 24V loads. Electrical loads can be connected indefinitely while the engine is running and a limited time when engine was OFF. The 24V system must be above 7 volts in order for the generator to turn ON. The generator features permanently lubricated bearings. Service should only include the tightening of mounting components. Otherwise the generator is replaced as a complete unit.

Battery Equalizer

The primary function of the Battery Equalizer is to maintain battery balance or equalization charge in a predominately 24V system which requires clean, regulated 12V power. The Battery Equalizer can deliver up to 150 amps of continuous, clean 12V current for practically any 12V load, such as two-way radios, navigations blackout lighting and other military options.

24V Voltmeter

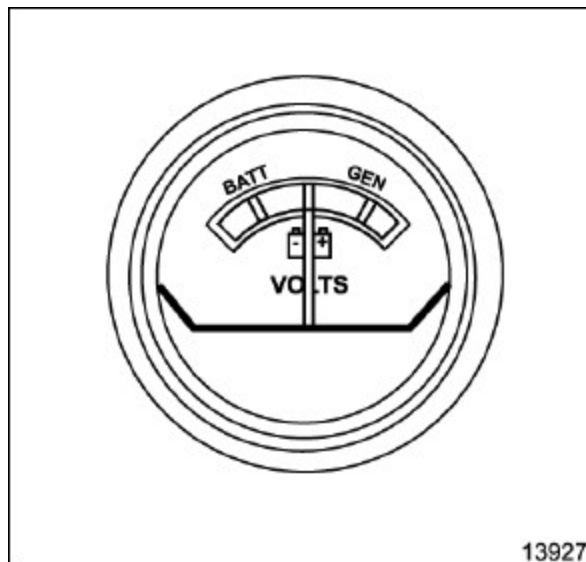
A voltmeter is installed to monitor the status of the 24-volt battery and the 24-volt generator.

Voltage is available through Circuit 901 (ORN) wire of the voltmeter relay. When the ignition switch is placed in the ON position voltage is applied to the power converter 24V regulator that provides voltage to the voltmeter relay. The voltmeter is grounded at G200 through the convenience centre.

Colour graduations as viewed from the front of the meter from left to right are as follows:

- Minimum voltage to activate the pointer is 18.0-volts
- Red/Yellow Break Point 22.0-volts
- Yellow/Green Break Point 26.0-volts
- Small Hack Mark (in green) 28.5-volts

The voltmeter needle should be in the green band during normal load operation. During no load situation the voltmeter needle should be between the yellow and green bands.



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Wiring Systems

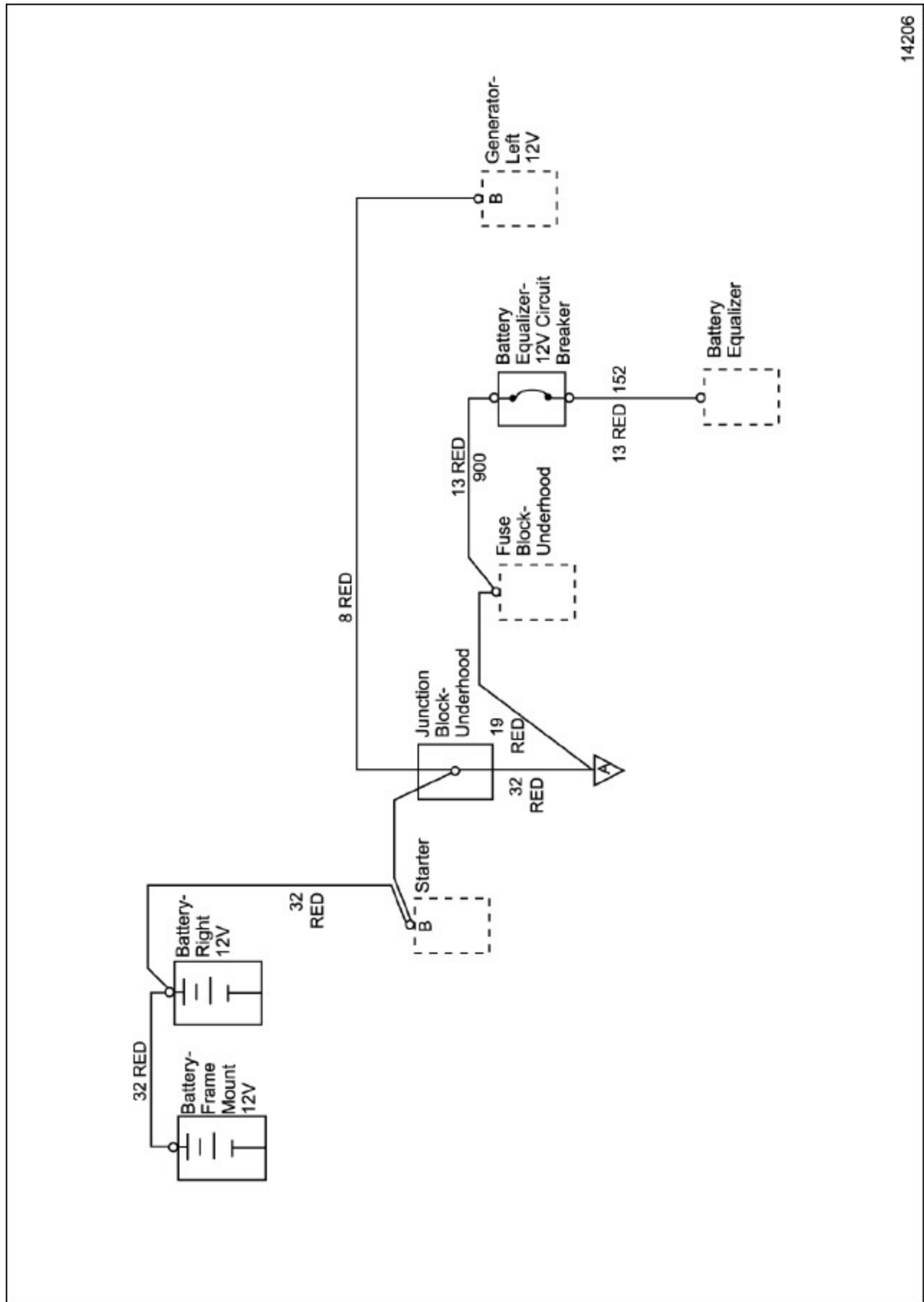
Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Battery Cable Connections	17 N•m	13 lb ft
Fender Brace Bolts	25 N•m	18 lb ft
Trailer Connector Bolts	7 N•m	62 lb in

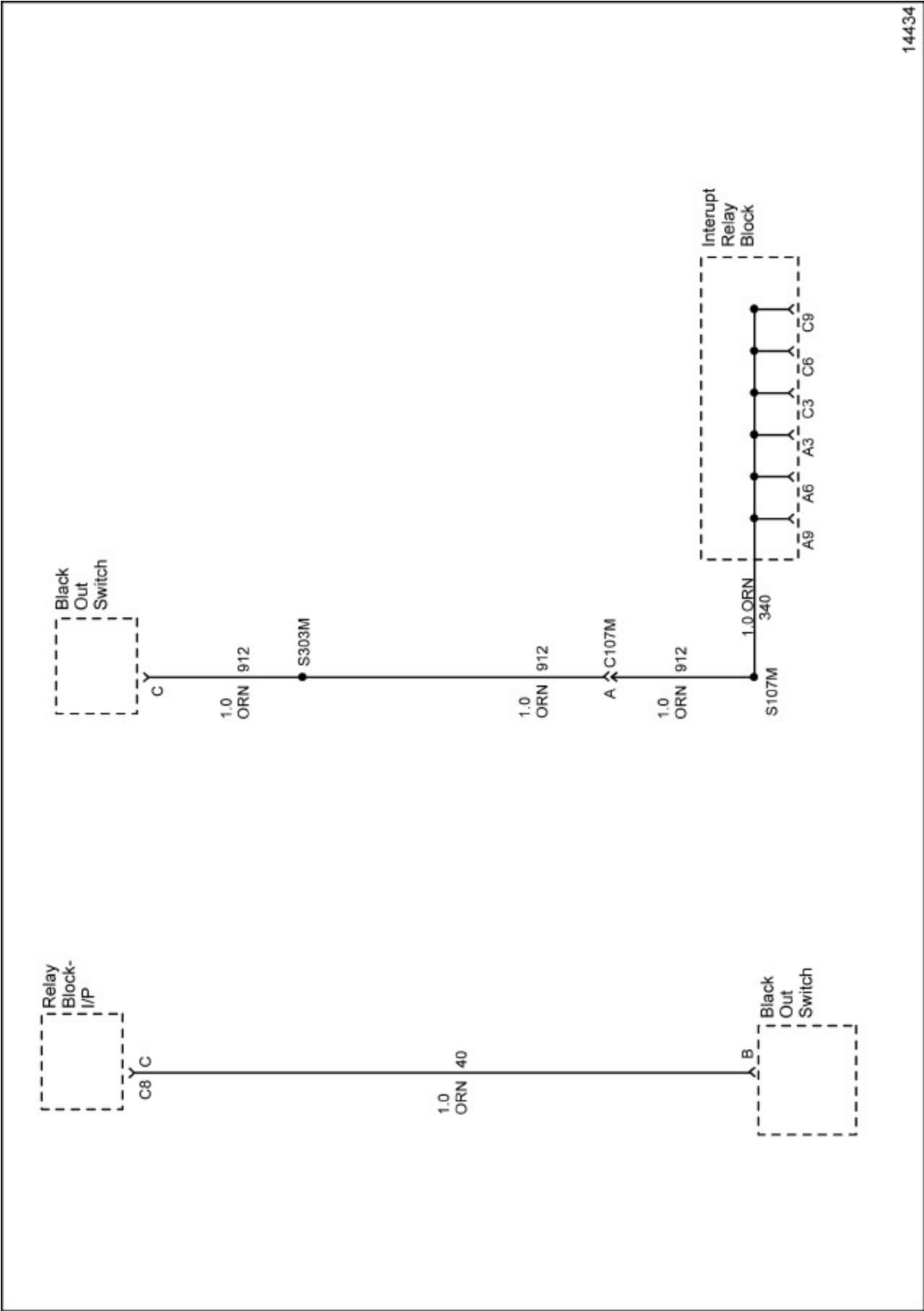
Schematic and Routing Diagrams

Power Distribution Schematics Power Distribution 12V

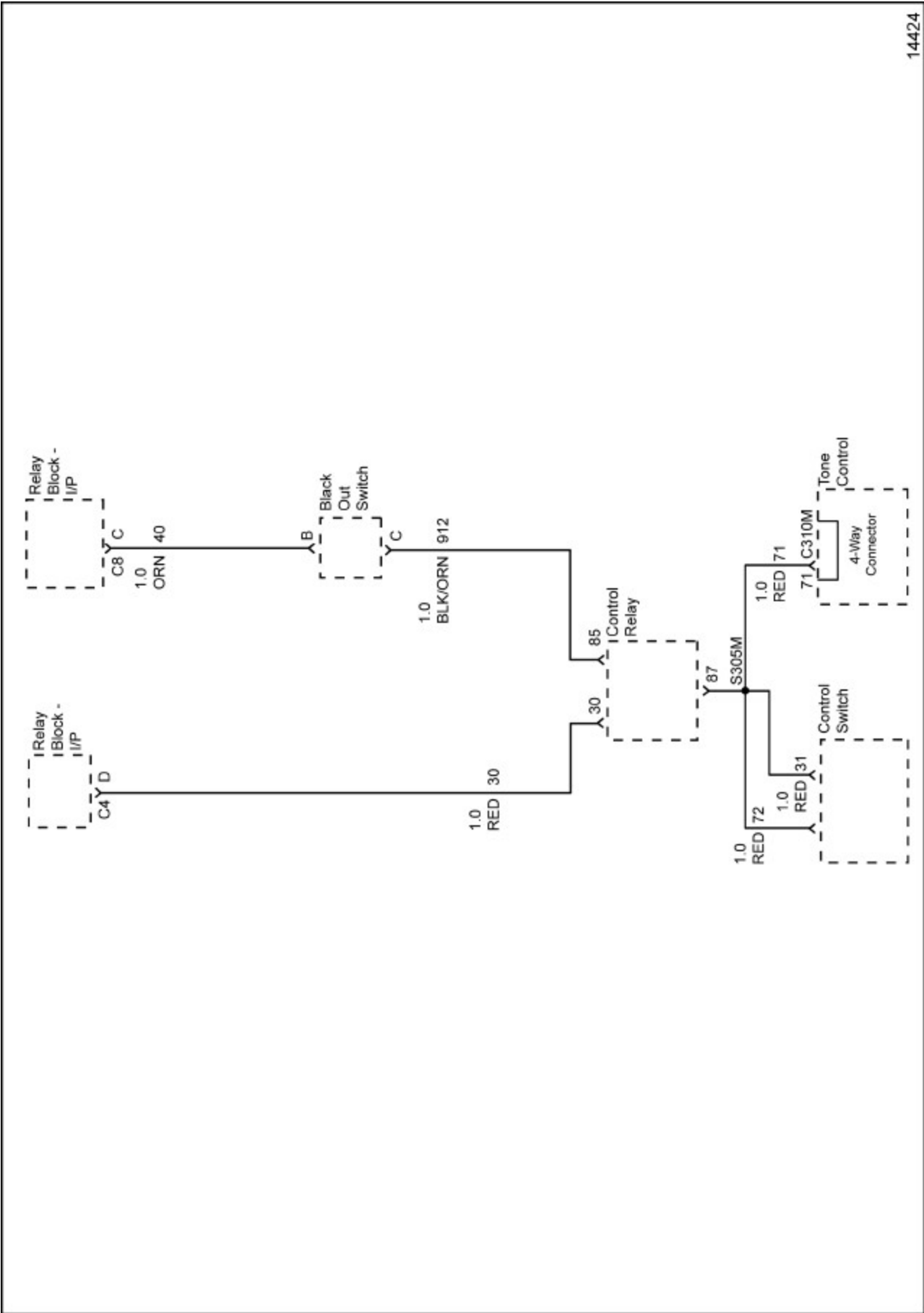


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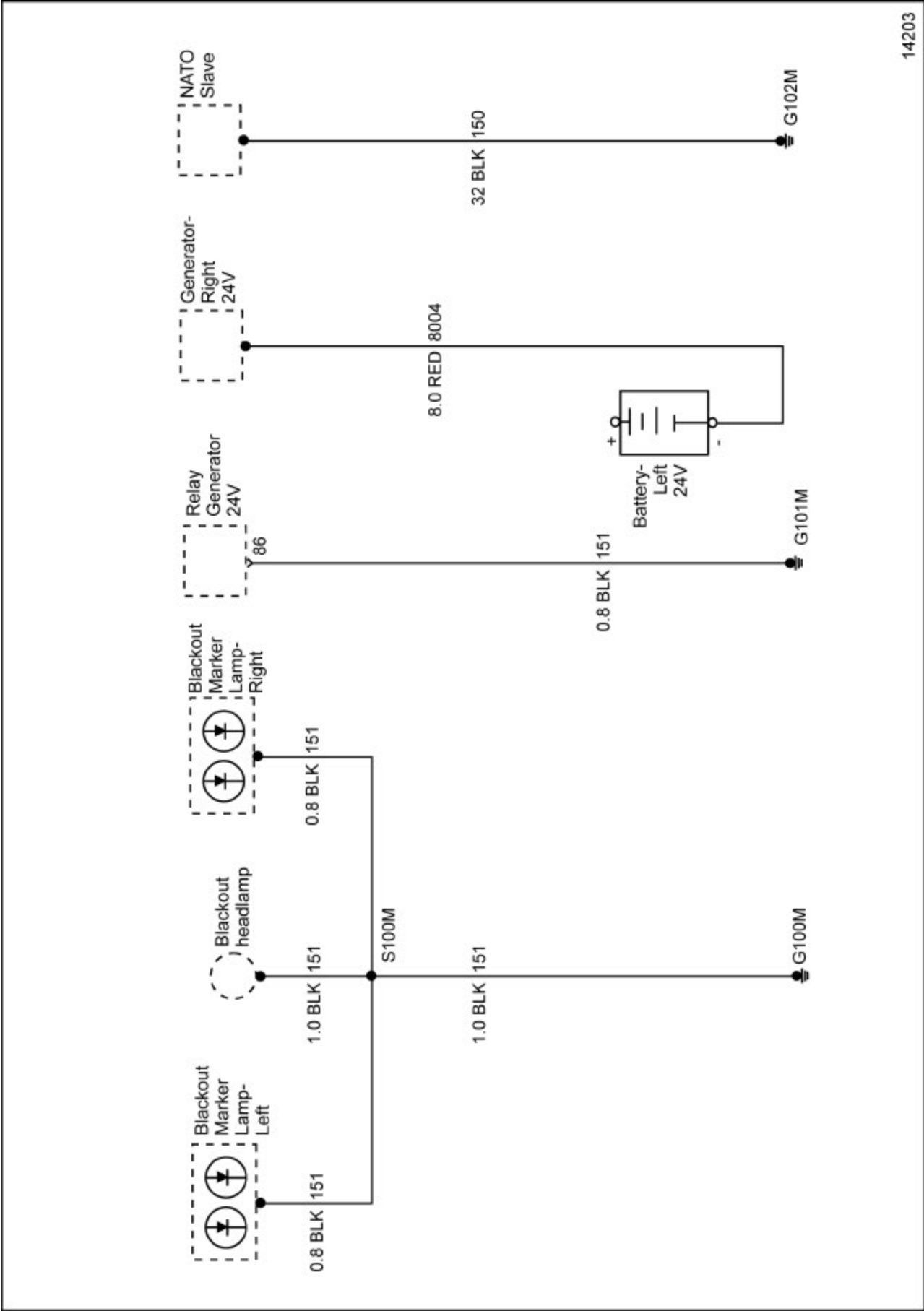
Power Distribution Relay Block



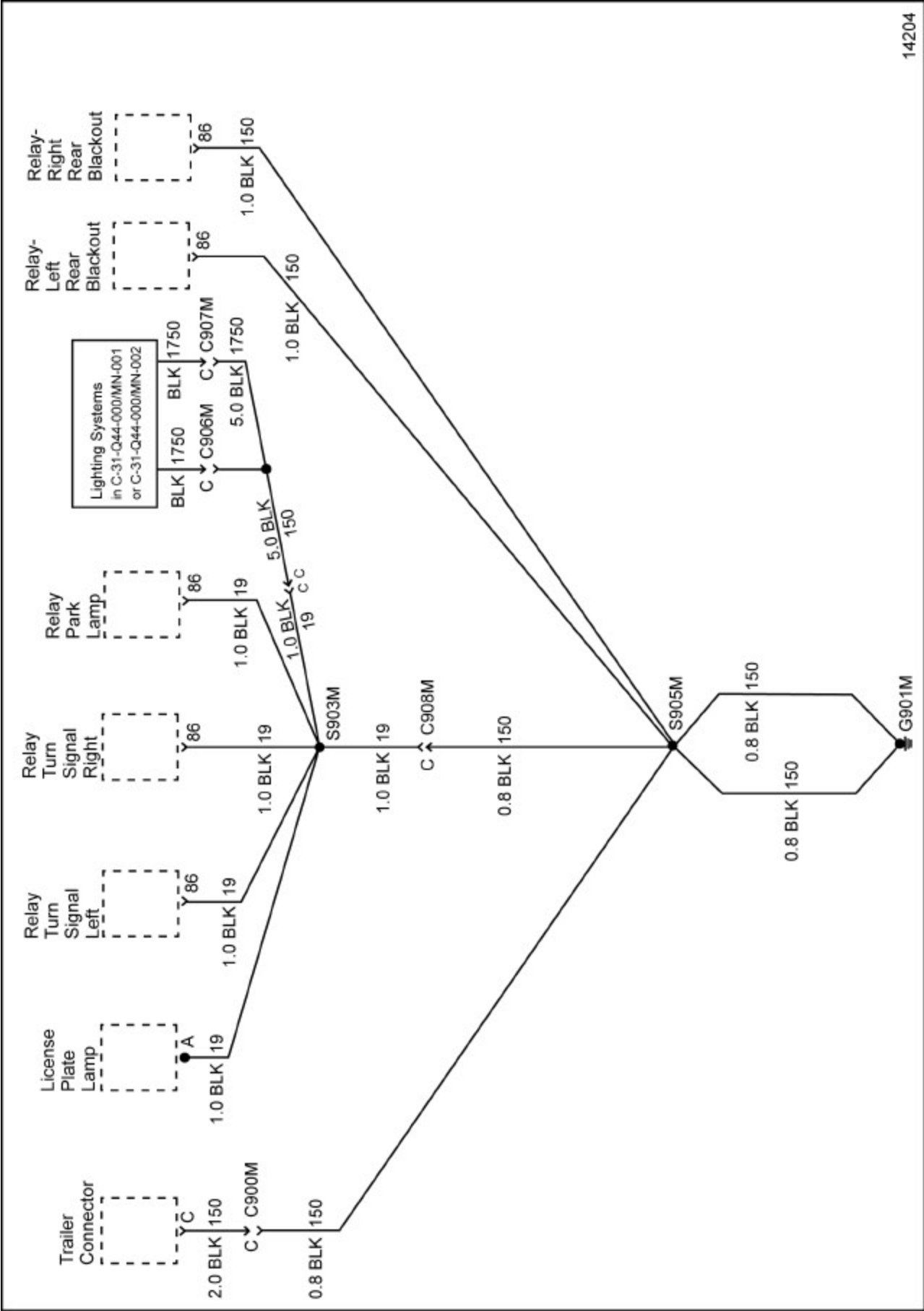
Power Distribution (MP)



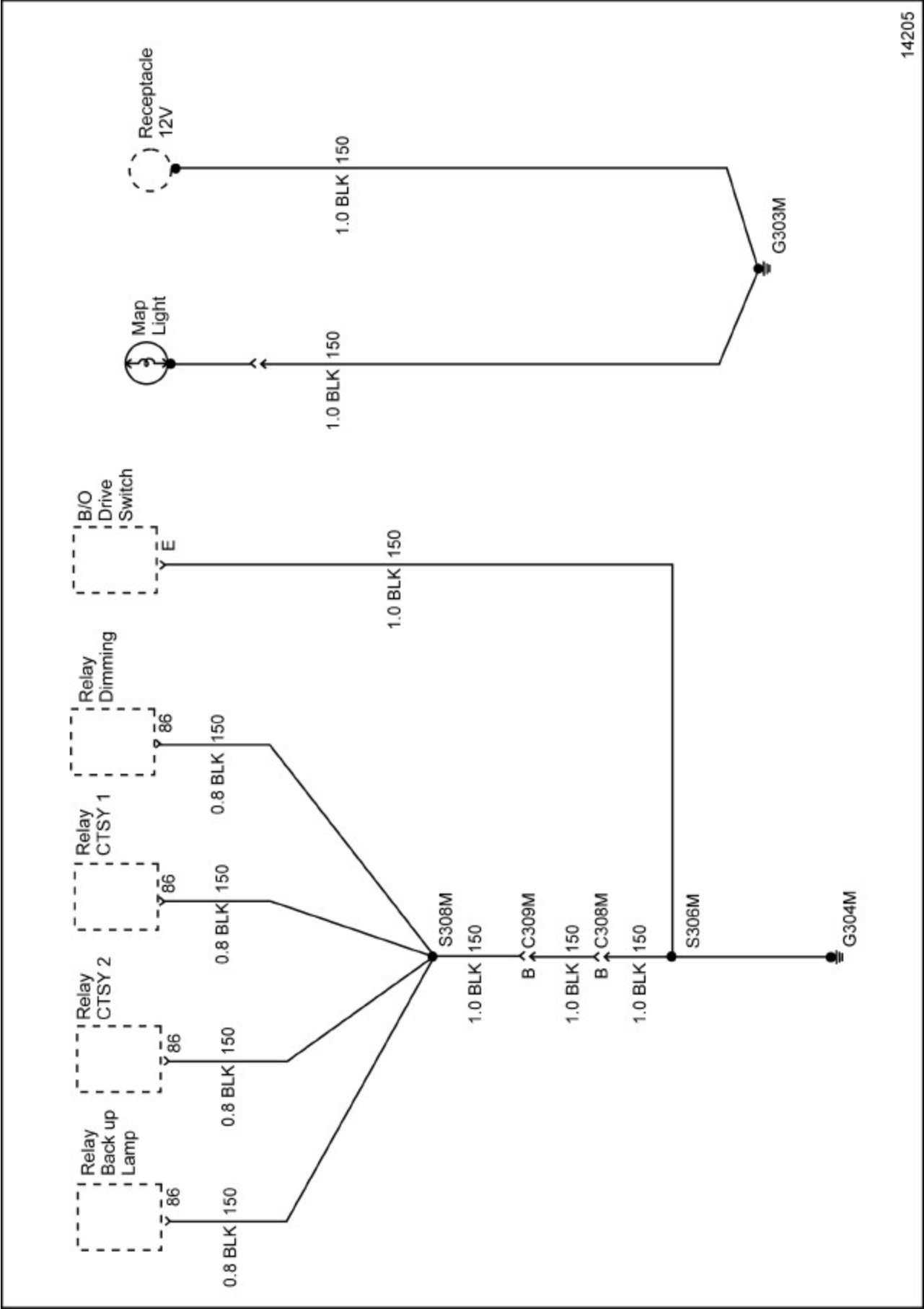
Ground Distribution
Ground Distribution (G100M, G101M, G102M)



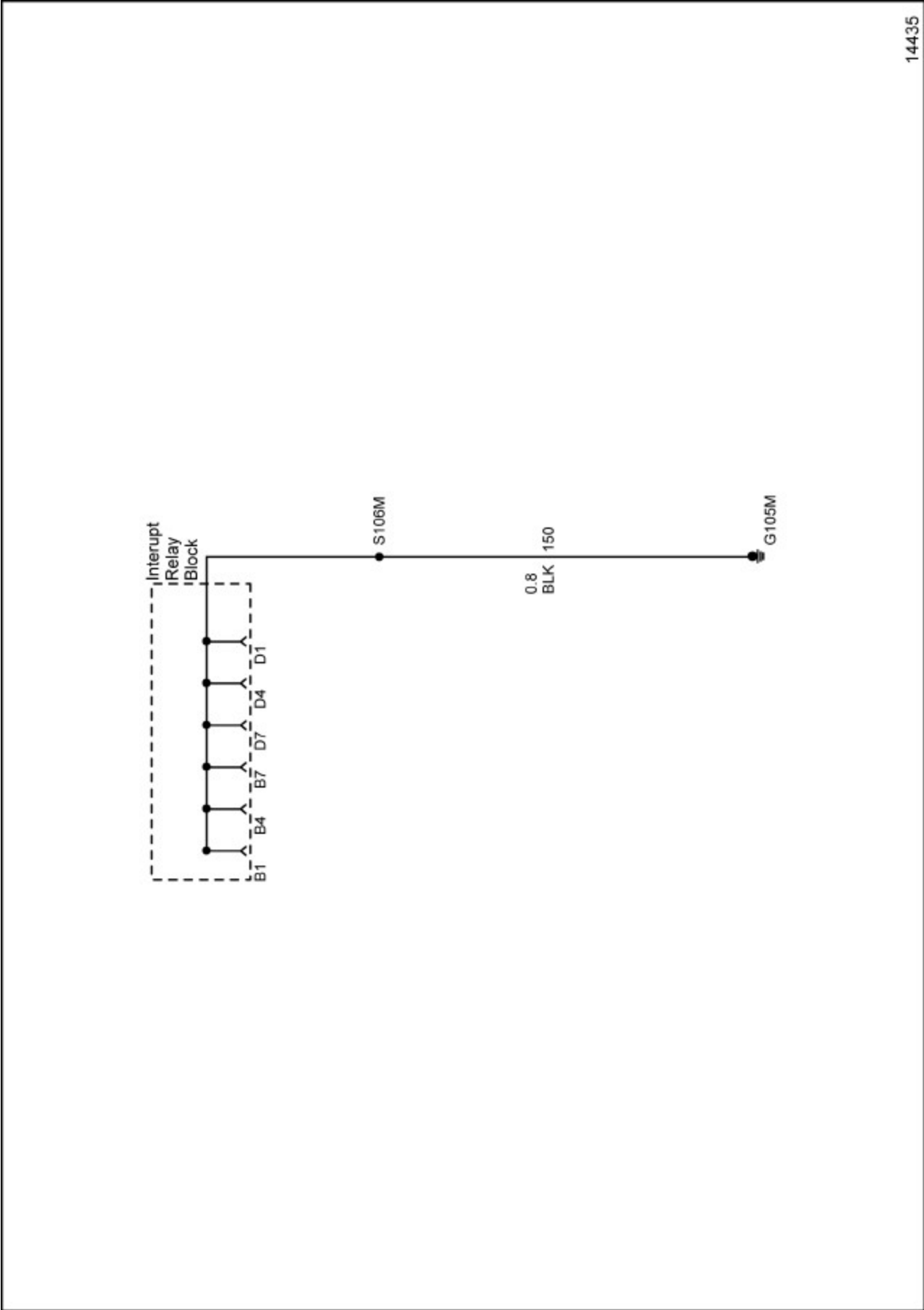
Ground Distribution (G901M)



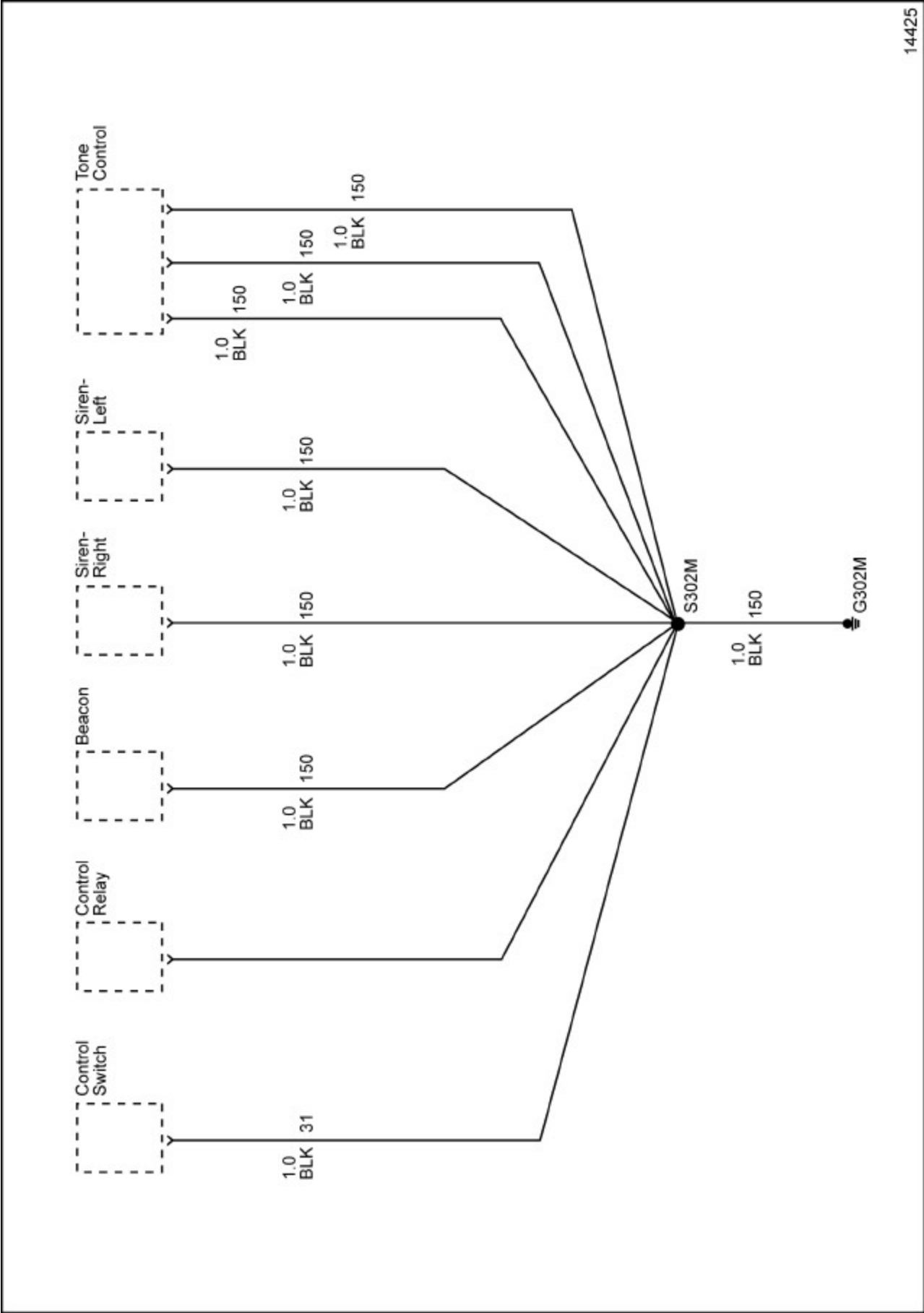
Ground Distribution (G303M, G304M)



Ground Distribution Relay Block



Ground Distribution (MP)



Component Locator

Master Electrical Component List

Name	Location	Locator View	Connector End View
Backup Lamp Relay	Inline on the interrupt harness under the I/P	—	—
Blackout (B/O) Control Relay	Inline on the auxiliary I/P harness	Instrument Panel, Gages, and Console Component Views in Instrument Panel, Gages, and Console	Instrument Panel, Gages, and Console Connector End Views in Instrument Panel, Gages, and Console
Blackout (B/O) Headlamp	On the left side of the bumper brush guard.	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Marker Lamp, LF	In the left side of the front bumper.	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Marker Lamp, RF	In the left side of the front bumper.	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Service Drive Switch	In the centre lower I/P next to the 24 V meter	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Stop/Marker Lamp, LR	In the left side of the rear bumper	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Stop/Marker Lamp, RR	In the right side of the rear bumper	Lighting Component Views in Lighting Systems	Lighting Connector End Views in Lighting Systems
Blackout (B/O) Switch (Headlamp)	In the centre lower I/P next to the 24 V meter	Instrument Panel, Gages, and Console Component Views in Instrument Panel, Gages, and Console	Instrument Panel, Gages, and Console Connector End Views in Instrument Panel, Gages, and Console
Battery - 12 V	Outside of frame rail under passenger seat	—	—
Battery - 12 V	At the RR engine compartment	—	—
Battery - 24V	At the left front of the engine compartment	—	—
Battery Booster Connector (NATO)	On the right side of the bumper brush guard.	Engine Electrical Component Views in Engine Electrical	—
Battery Equalizer	Rear body panel, behind the seat	—	—
Circuit Breaker 12V	In the engine compartment, on the left fender brace	Engine Electrical Component Views in Engine Electrical	Engine Electrical Connector End Views in Engine Electrical
Circuit Breaker 24V	In the engine compartment, on the left fender brace	Engine Electrical Component Views in Engine Electrical	Engine Electrical Connector End Views in Engine Electrical

Master Electrical Component List (cont'd)

Name	Location	Locator View	Connector End View
CTSY 1 and 2 Relay	Inline on the interrupt harness under the I/P.	—	—
DRL Relay	Interrupt relay block RH engine compartment	Lighting Systems Component Views in Lighting Systems	—
Fuel Fired Heater	Under the air cleaner housing	—	Engine Cooling Connector End Views in Engine Cooling
Fuel Fired Heater Switch	In the left side of the I/P Bezel	—	—
Generator – 24V	The right front of Engine	—	—
Generator Relay – 24V	On the cover of the fuse block-underhood	—	—
Generator – Fuses 24V	In the engine compartment inline with the 24V generator harness	—	—
Headlamp Hi and Low Beam Relay	Interrupt relay block RH engine compartment	—	Engine Cooling Connector End Views in Engine Cooling
Horn Relay	—	—	—
Junction Block	Left of RH battery	Engine Electrical Component Views in Engine Electrical	Engine Electrical Connector End Views in Engine Electrical
MP Sirens	Behind the front grille	—	—
MP Control Switch	Mounted in the lower centre of the I/P	—	—
MP Warning Light	External mounted on the antenna bar	—	—
Park Lamp Relay	Interrupt relay block RH engine compartment	—	Engine Cooling Connector End Views in Engine Cooling
Trailer Harness Connector 12 Pin	Near the centre of the rear bumper	Lighting Systems Component Views in Lighting Systems	Lighting Systems Connector End Views in Lighting Systems
24 Voltmeter Lamp	Mounted in the lower centre of the I/P	Engine Electrical Component Views in Engine Electrical	Engine Electrical Connector End Views in Engine Electrical
C100M (1 Cavity)	Front left of the front bumper for left front blackout (B/O) marker	—	Inline Harness Connector End Views in Wiring Systems
C101M (1 Cavity)	Front right of the front bumper for right front blackout (B/O) marker	—	Inline Harness Connector End Views in Wiring Systems
C102M (1 Cavity)	Front left centre of grille for blackout (B/O) headlamp	—	Inline Harness Connector End Views in Wiring Systems
C103M (2 Cavities)	Left side of engine compartment for front lighting harness	—	Inline Harness Connector End Views in Wiring Systems

Master Electrical Component List (cont'd)

Name	Location	Locator View	Connector End View
C104M (1 Cavity)	Engine compartment	—	Inline Harness Connector End Views in Wiring Systems
C105M (4 Cavities)	Engine compartment by Underhood fuse block	—	Inline Harness Connector End Views in Wiring Systems
C106M (3 Cavities)	Engine compartment by Underhood fuse block	—	Inline Harness Connector End Views in Wiring Systems
C107M (1 Cavity)	Engine compartment by Underhood fuse block	—	Inline Harness Connector End Views in Wiring Systems
C108M (2 Cavities)	Left rear frame rail towards rear of the vehicle	—	Inline Harness Connector End Views in Wiring Systems
C109M (1 Cavity)	Left rear frame rail towards rear of the vehicle	—	Inline Harness Connector End Views in Wiring Systems
C110M (1 Cavity)	Engine compartment by Underhood fuse block	—	Inline Harness Connector End Views in Wiring Systems
C301M (2 Cavities)	Under I/P for topper lamp	—	Inline Harness Connector End Views in Wiring Systems
C302M (2 Cavities)	Under I/P for brake lamps	—	Inline Harness Connector End Views in Wiring Systems
C303M (1 Cavity)	Relay block – I/P C4, Cavity E	—	Inline Harness Connector End Views in Wiring Systems
C304M (2 Cavities)	Blackout (B/O) panel for voltmeter	—	Inline Harness Connector End Views in Wiring Systems
C305M (2 Cavities)	Under I/P for CTSY interrupt	—	Inline Harness Connector End Views in Wiring Systems
C306M (1 Cavity)	Under I/P for backup lamps	—	Inline Harness Connector End Views in Wiring Systems
C307M (7 Cavities)	Under I/P Dimming Relay	—	Inline Harness Connector End Views in Wiring Systems
C308M (2 Cavities)	Under I/P for blackout (B/O) switch	—	Inline Harness Connector End Views in Wiring Systems
C309M (2 Cavities)	Under I/P in the relay harness	—	Inline Harness Connector End Views in Wiring Systems

Master Electrical Component List (cont'd)

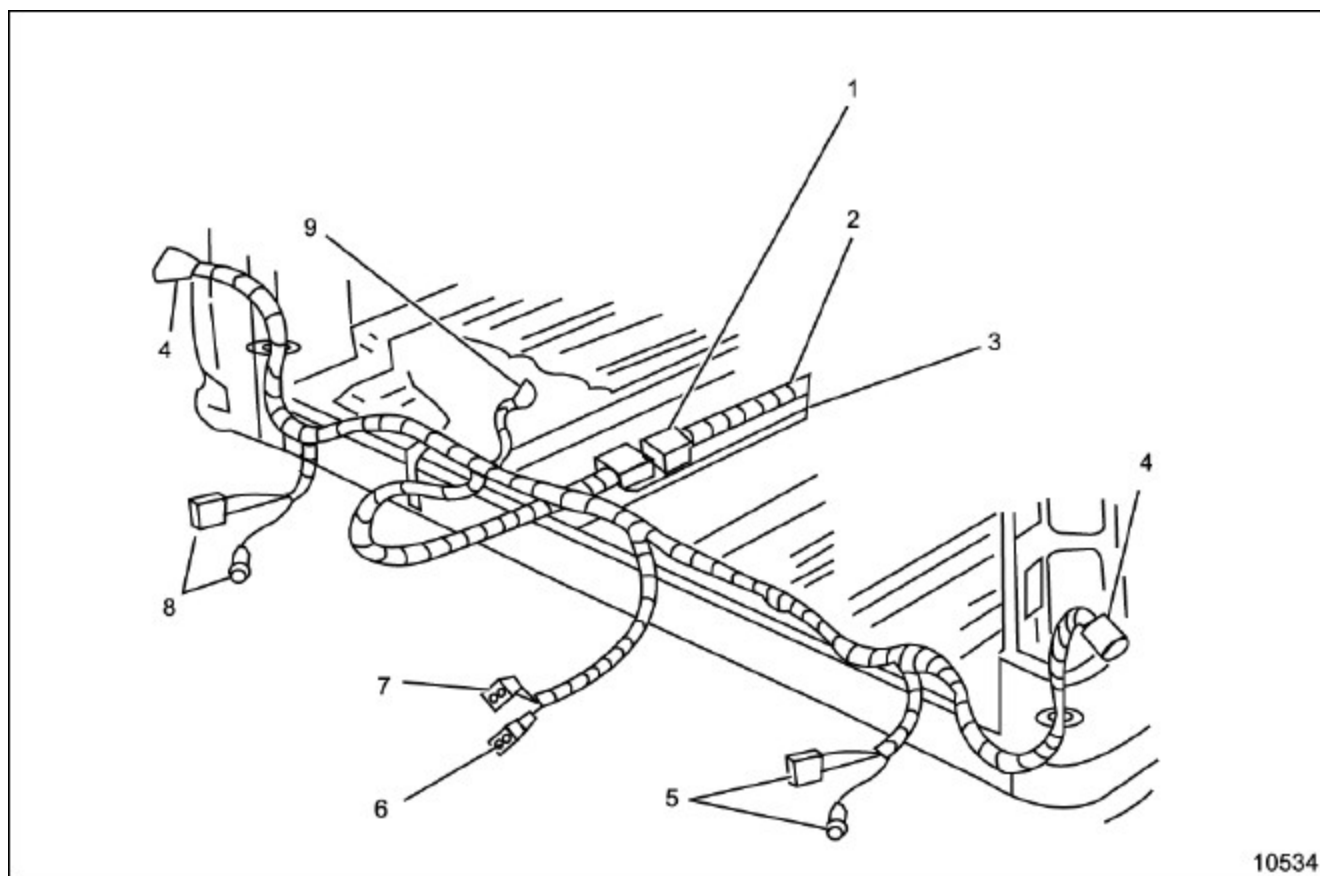
Name	Location	Locator View	Connector End View
C310 (4 Cavities)	Tone control module under the I/P	—	Inline Harness Connector End Views in Wiring Systems
C311 (1 Cavity)	Tone control module under the I/P	—	Inline Harness Connector End Views in Wiring Systems
C312 (1 Cavity)	Tone control module under the I/P	—	Inline Harness Connector End Views in Wiring Systems
C313 (6 Cavities)	Tone control module under the I/P	—	Inline Harness Connector End Views in Wiring Systems
C900M (3 Cavities)	Rear bumper for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C901M (3 Cavities)	Rear bumper for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C902M (2 Cavities)	Rear bumper for right blackout (B/O) marker	—	Inline Harness Connector End Views in Wiring Systems
C903M (2 Cavities)	Rear bumper for left blackout (B/O) marker	—	Inline Harness Connector End Views in Wiring Systems
C904M (2 Cavities)	Right rear behind taillamp	—	Inline Harness Connector End Views in Wiring Systems
C905M (4 Cavities)	Rear of vehicle for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C906M (4 Cavities)	Rear of vehicle for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C907M (4 Cavities)	Rear of vehicle for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C908M (4 Cavities)	Rear of vehicle for trailer connector	—	Inline Harness Connector End Views in Wiring Systems
C909M (1 Cavity)	Rear bumper for B/O relay	—	Inline Harness Connector End Views in Wiring Systems
G100M	In the front blackout (B/O) harness front of vehicle	—	—
G101M	In the 24V generator harness	—	—
G102M	Lower right side of engine block	—	—
G103M	Right side of engine block	—	—

Master Electrical Component List (cont'd)

Name	Location	Locator View	Connector End View
G104M	Left side of bulkhead next to the power brake booster	—	—
G105M	Left side of bulkhead next to the power brake booster	—	—
G301M	Right outer side of frame rail	—	—
G302M	In the MP harness next to the siren controller	—	—
G303M	In the Map light harness under the I/P	—	—
G304M	Under left side of I/P	—	—
G901M	In the rear blackout (B/O) harness at the rear of the vehicle	—	—
G902M	Right side of the rear bumper	—	—
G903M	Left side of the rear bumper	—	—
S100M	In front bracket wiring harness behind front bumper	—	—
S101M	In front blackout (B/O) wiring harness behind front bumper	—	—
S102M	In the front blackout (B/O) harness at front bumper	—	—
S103M	In the 24V generator harness in the engine compartment	—	—
S104M	In the 24V generator harness in the engine compartment	—	—
S105M	In the 24V generator harness in the engine compartment	—	—
S106M	In the relay block harness next to the Underhood fuse block	—	—
S107M	In the relay block harness next to the Underhood fuse block	—	—
S301M	In the voltage regulator harness under the I/P	—	—
S302M	In the MP harness under the I/P	—	—
S303M	In I/P wiring harness under I/P	—	—
S304M	In I/P wiring harness under I/P	—	—
S305M	In the MP harness under the I/P	—	—
S306M	In the relay block harness next to the Underhood fuse block	—	—
S307M	In the relay block harness next to the Underhood fuse block	—	—
S308M	In the interrupt relay harness under the I/P	—	—
S309M	In the interrupt relay harness under the I/P	—	—

Master Electrical Component List (cont'd)

Name	Location	Locator View	Connector End View
S310M	In the interrupt relay harness under the I/P	—	—
S311M	In the interrupt relay harness under the I/P	—	—
S312M	In the interrupt relay harness under the I/P	—	—
S313M	In the I/P harness under the I/P	—	—
S901M	In the rear blackout (B/O) harness at rear bumper	—	—
S902M	In the rear blackout (B/O) harness at rear bumper	—	—
S903M	In the trailer harness at rear bumper	—	—
S904M	In the rear trailer harness at rear bumper	—	—
S905M	In the rear blackout (B/O) harness at the rear bumper	—	—
S906M	In the extension lamp harness behind the left rear taillamp	—	—
S907M	In the rear blackout (B/O) harness at the rear bumper	—	—
S908M	In the trailer harness at rear bumper	—	—

Power and Grounding Component Views**Rear Lamp Harness****Legend**

(1) C908M

(2) Auxiliary Rear Lamp Extension Harness

(3) Rear of Vehicle

(4) Rear Taillamp Connectors

(5) C902M

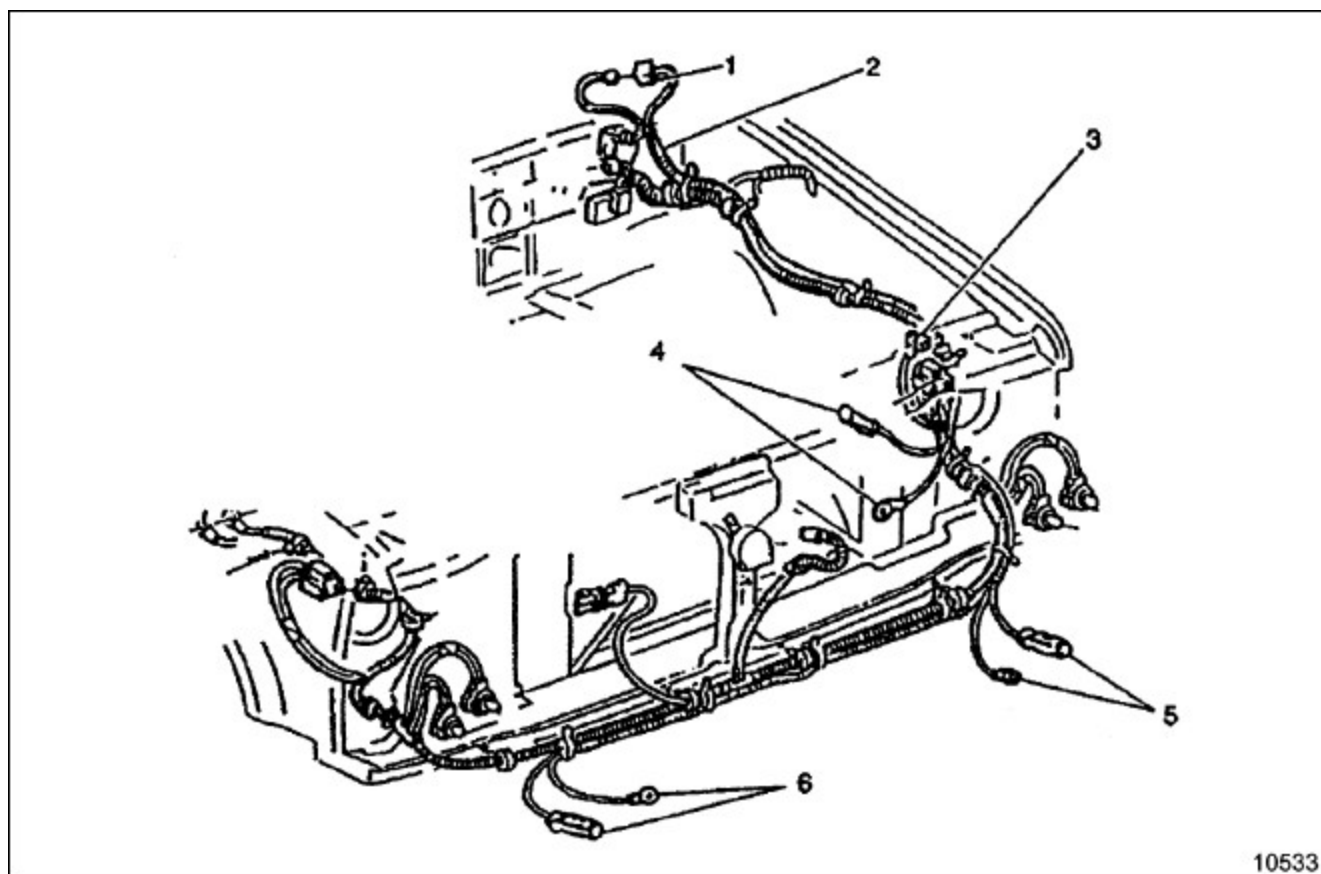
(6) C901M

(7) C900M

(8) C903M

(9) G901M

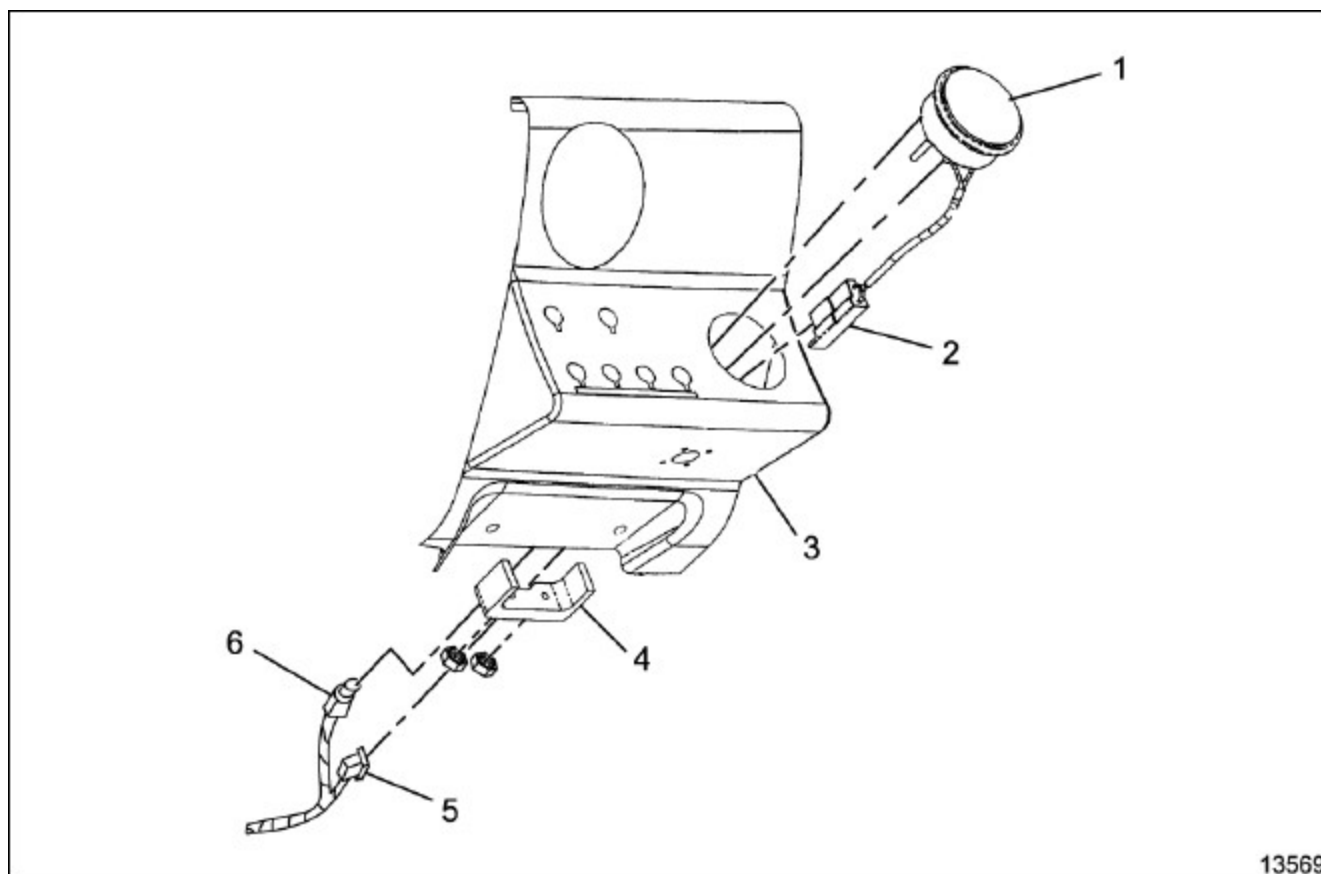
Forward Blackout (B/O) Lamp Harness

**Legend**

- (1) I/P Wiring Harness
- (2) Forward Lamp Harness
- (3) G100M

- (4) C102M
- (5) C101M
- (6) C100M

Voltmeter and Lamp



13569

Legend

(1) Voltmeter (24V)

(2) Voltmeter Connector

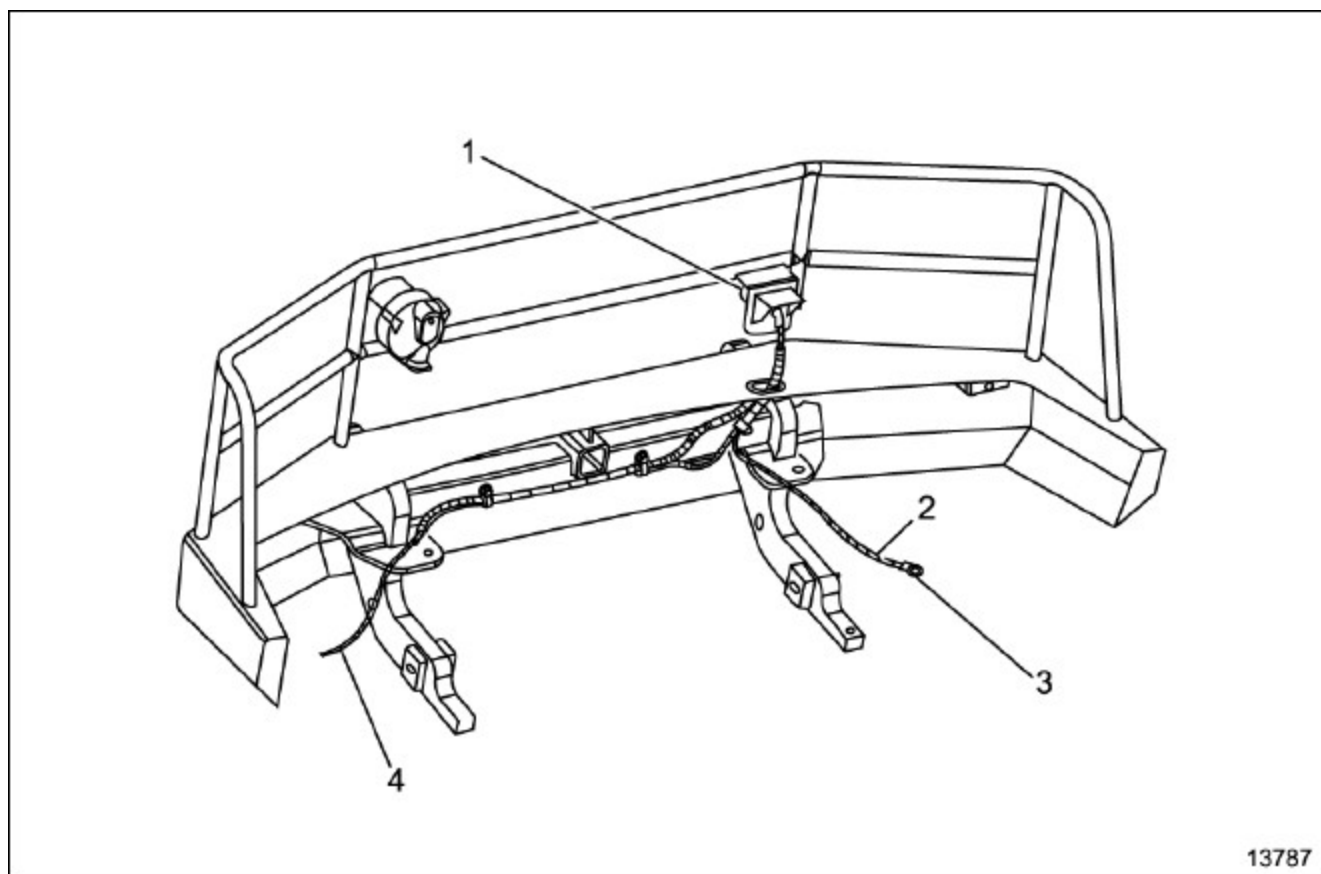
(3) Mounting Bracket

(4) Bracket

(5) Harness Connector

(6) Voltmeter Illumination Bulb

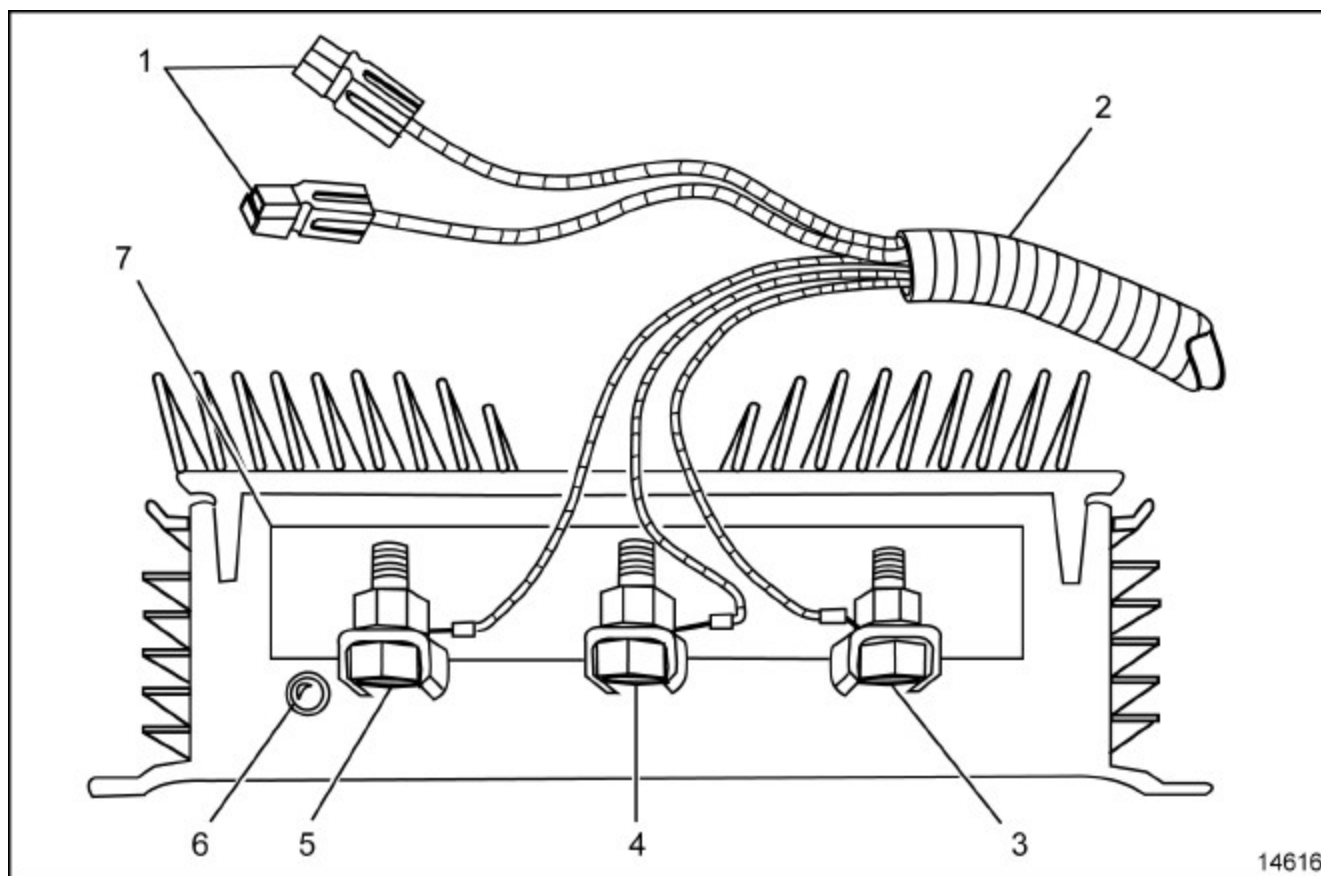
Slave Receptacle Harness Routing

**Legend**

- (1) Slave Receptacle
- (2) Negative Cable

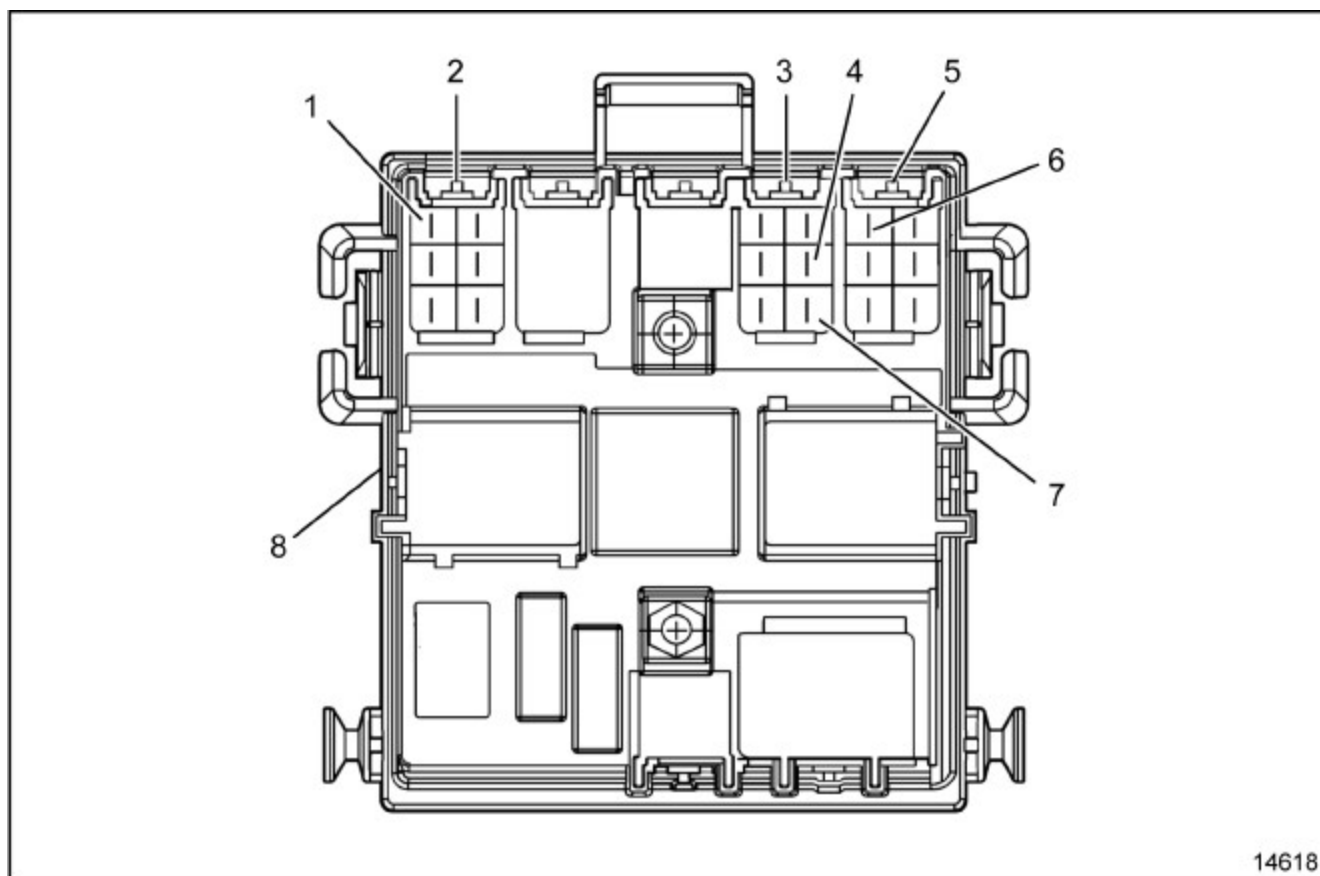
- (3) Negative Connection to Engine Block
- (4) Positive Cable to Junction Block

Battery Equalizer

**Legend**

- | | |
|---------------------------------------|-------------------------------------|
| (1) To Power Distribution Box Harness | (5) 24V Connection (Black/Red Wire) |
| (2) Battery Equalizer Harness | (6) LED Status Indicator |
| (3) Ground Terminal (Black Wire) | (7) Battery Equalizer |
| (4) 12V Connection (Red Wire) | |

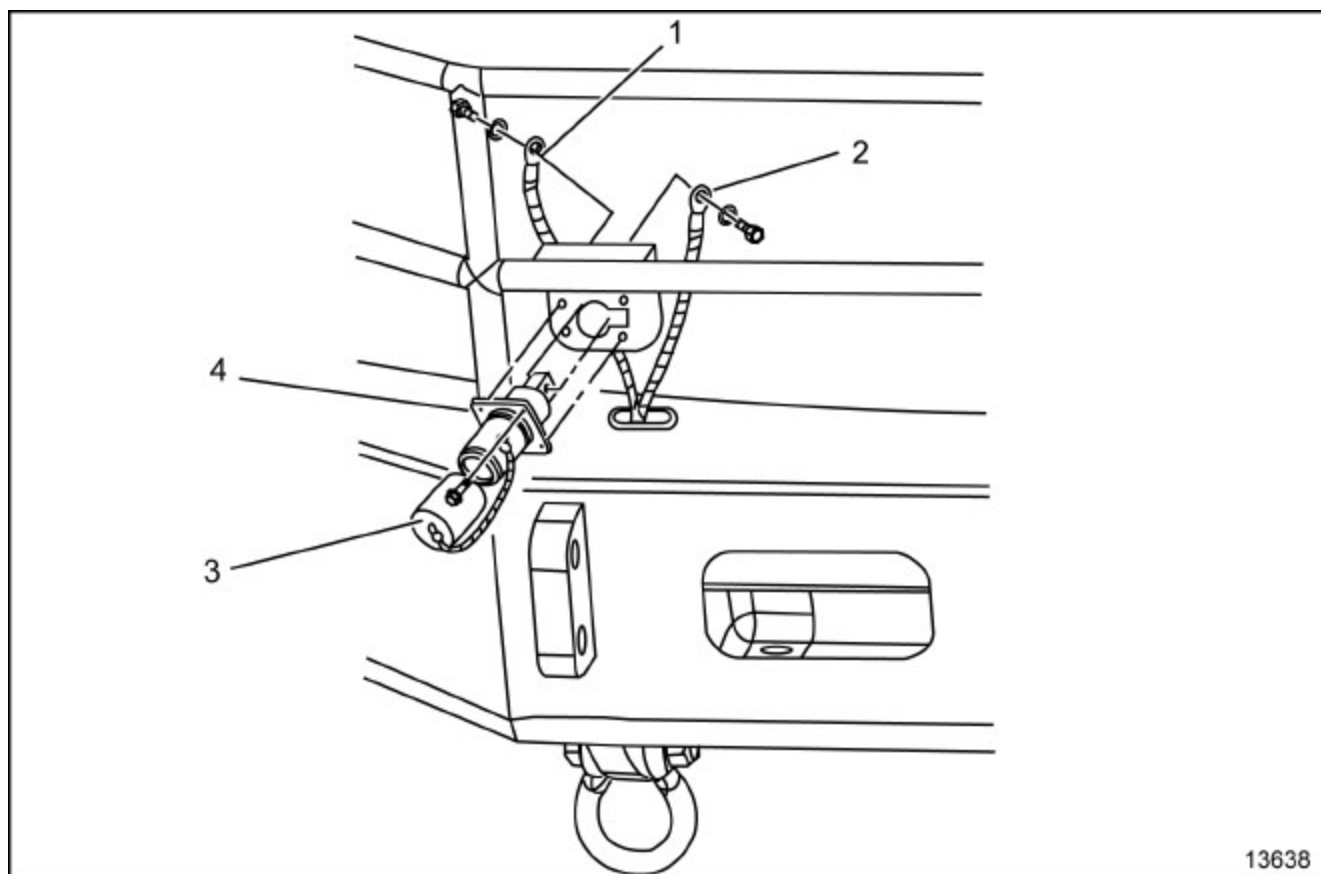
Relay Block – IP

**Legend**

- (1) Cavity C – Blackout (B/O) Switch
- (2) C8 – Connector Location
- (3) C5 – Connector Location
- (4) E – 24V Meter Ground

- (5) C4 – Connector Location
- (6) Cavity D – Map/Receptacle
- (7) Cavity F – 24V Meter
- (8) Relay Block – IP

Slave Receptacle Assembly

**Legend**

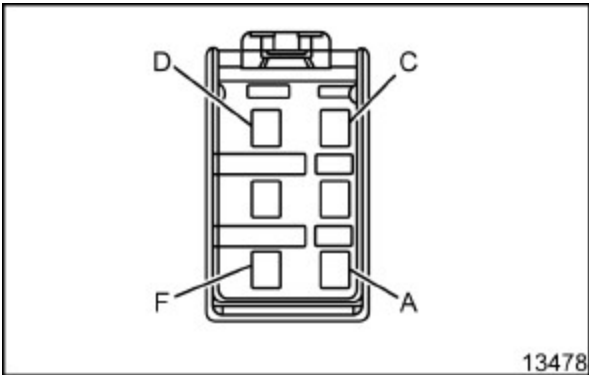
- (1) Battery Negative Ground (Black)
(2) Battery Positive Ground (Red)

- (3) Slave Receptacle Cover
(4) Slave Receptacle

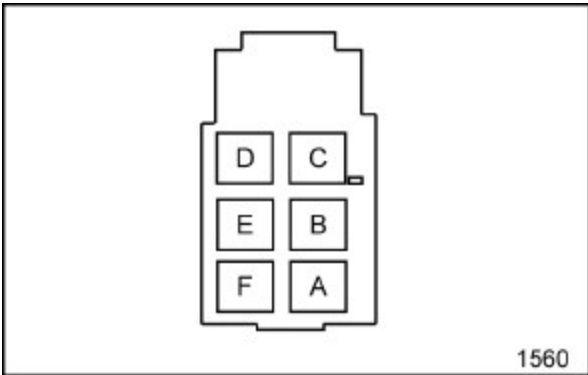
Power and Grounding Connector End Views

Electrical Centre Identification Views

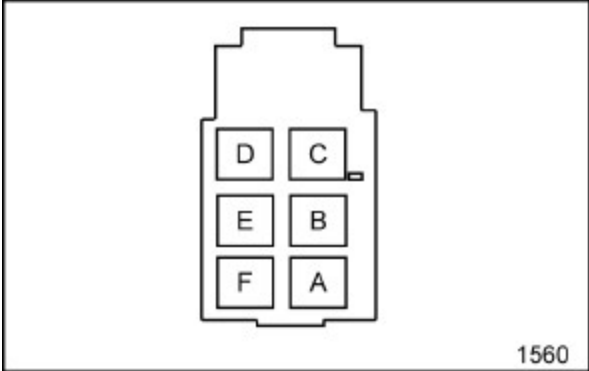
Relay Block - I/P C4

			
Connector Part Information		<ul style="list-style-type: none"> 12193922 6-Way F Metri-Pack 280 Series Flexlock (CRM) 	
Pin	Wire Colour	Circuit No.	Function
A	—	—	Not Used
B	PNK	1691	Automatic Day/Night Mirror Low Reference (YE9/36)
C	GRY	1690	Automatic Day/Night Mirror Signal
D	DK GRN	734	Inside Air Temperature Sensor Signal (CJ2)
E	RED	40	Map Light/Receptacle Supply Voltage
F	WHT/BLK	5515	Inside Air Temperature Sensor Assembly Control (CJ2)

Relay Block - I/P C5

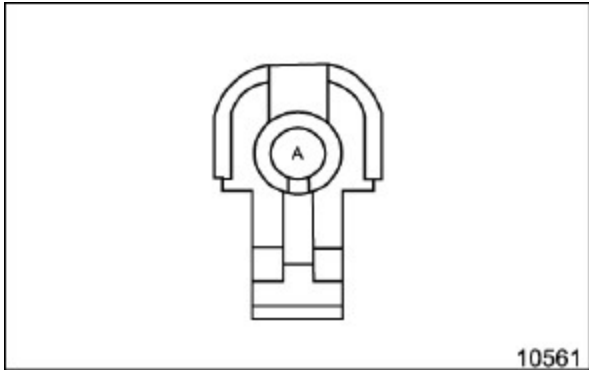
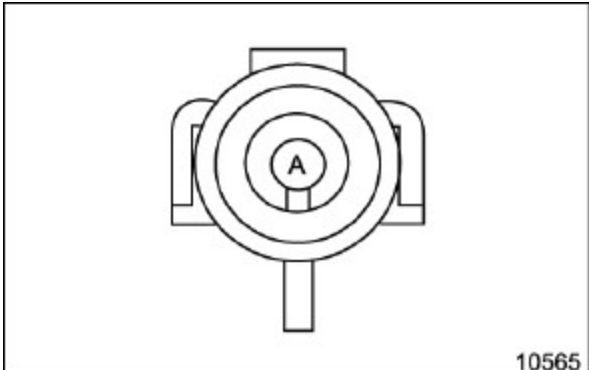
			
Connector Part Information		<ul style="list-style-type: none"> 12193928 6-Way F Metri-Pack 280 Series Flexlock (GRY) 	
Pin	Wire Colour	Circuit No.	Function
A	—	—	Not Used
B	PPL/WHT	1382	LED Dimming Signal (ZX3)
	PPL/WHT	1382	LED Dimming Signal (5G4/5X7/5Y0/TRW)
C	TAN/WHT	1384	Selective Ride Control Switch Signal (ZX3)
D	PNK	739	Ignition 1 Voltage (ZX3)
E	BLK	150	Ground
F	BRN	9	24V Meter Supply Voltage

Relay Block - I/P C8

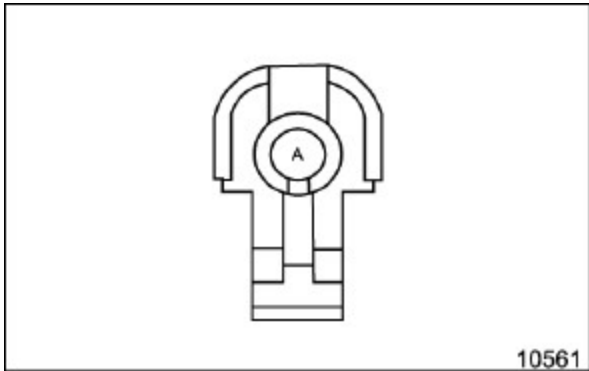
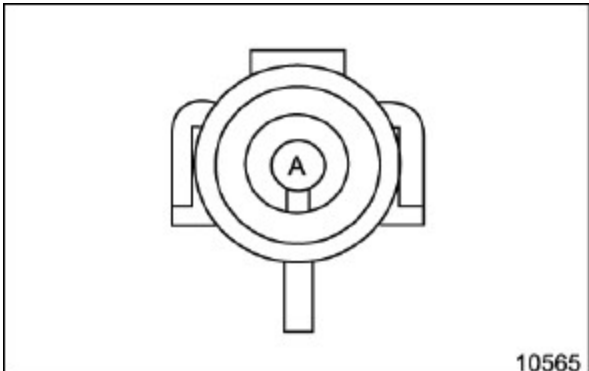
			
Connector Part Information		<ul style="list-style-type: none"> • 12193922 • 6-Way F Metri-Pack 280 Series Flexlock (CRM) 	
Pin	Wire Colour	Circuit No.	Function
A	ORN	2340	Battery Positive Voltage (5G4/TRW)
B	—	—	Not Used
C	ORN	40	Blackout (B/O) Service Switch
D	—	—	Not Used
E	ORN	4540	Battery Positive Voltage (5G4/5X7/5Y0/TRW)
F	BLK	1050	Ground (TRW)

Inline Harness Connector End Views

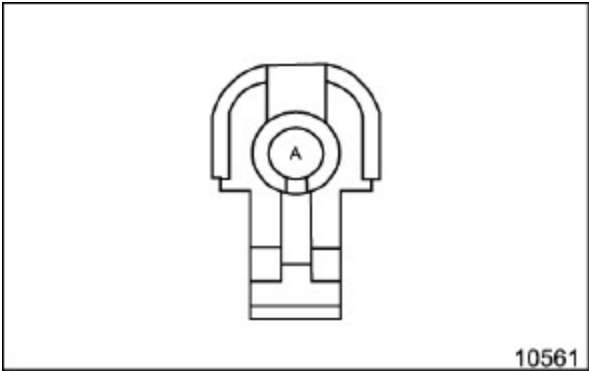
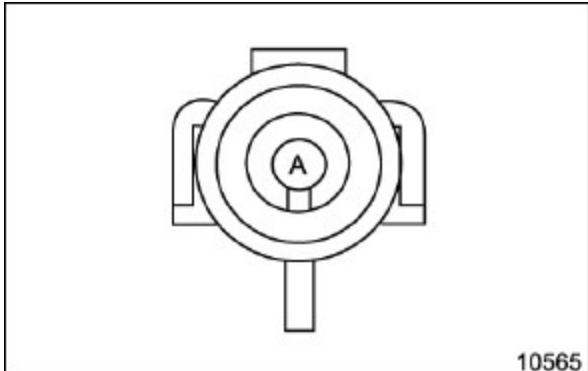
Inline Harness Connector C100M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	900	Blackout (B/O) Marker Lamp (RF)	A	BLK	—	Blackout (B/O) Marker Lamp (RF)

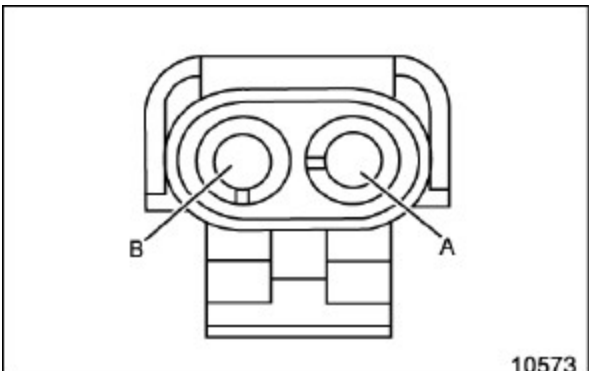
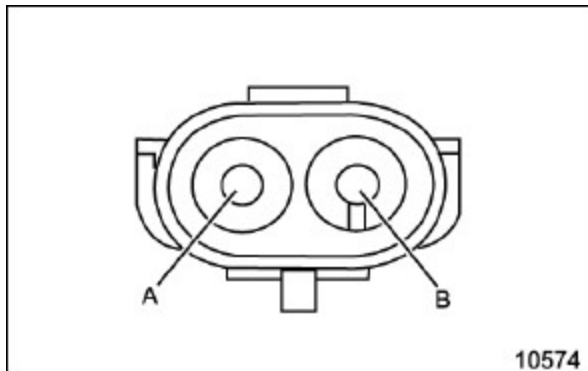
Inline Harness Connector C101M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	900	Blackout (B/O) Marker Lamp (LF)	A	BLK	—	Blackout (B/O) Marker Lamp (LF)

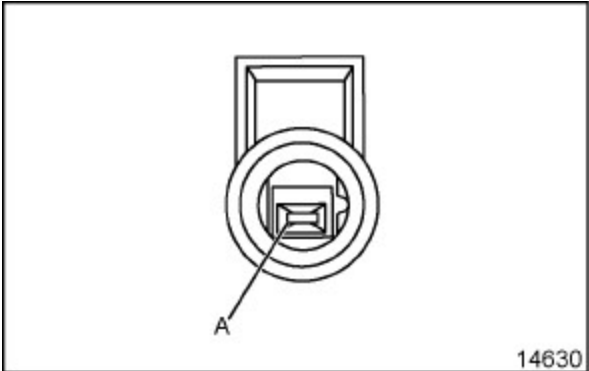
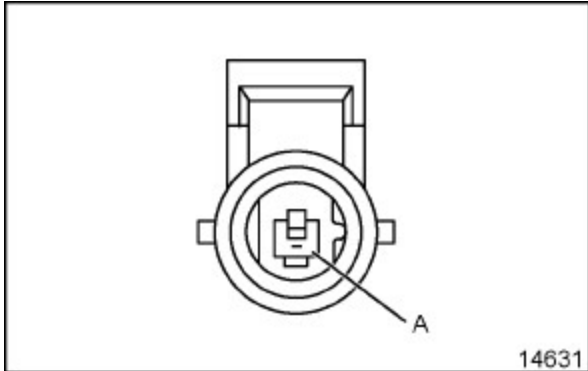
Inline Harness Connector C102M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BLK	—	Blackout (B/O) Headlamp Voltage	A	TAN/WHT	901	Blackout (B/O) Headlamp Voltage

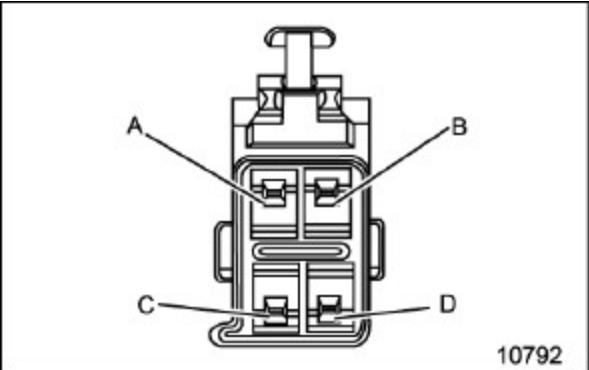
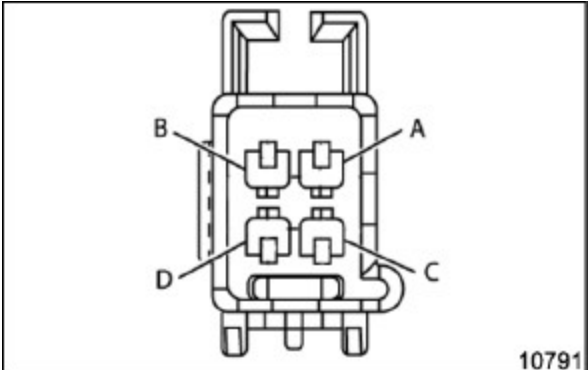
Inline Harness Connector C103M

							
Connector Part Information		<ul style="list-style-type: none"> • 12010972 • 2-Way F Weather Pack SHD (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12015793 • 2-Way M Weather Pack TWR (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	TAN/WHT	901	Blackout (B/O) Head Lamp	A	TAN/WHT	901	Blackout (B/O) Head Lamp
B	BRN/ WHT	900	Blackout (B/O) Marker Lamps	B	BRN/ WHT	900	Blackout (B/O) Marker Lamps

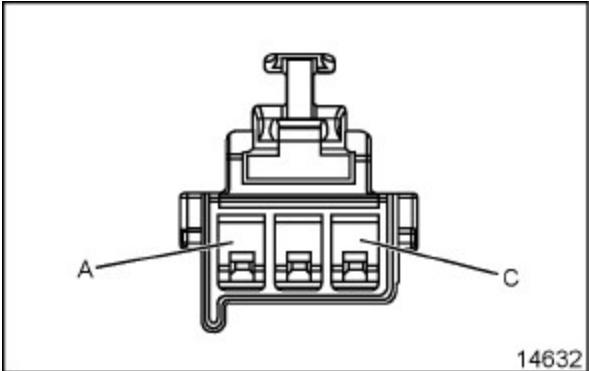
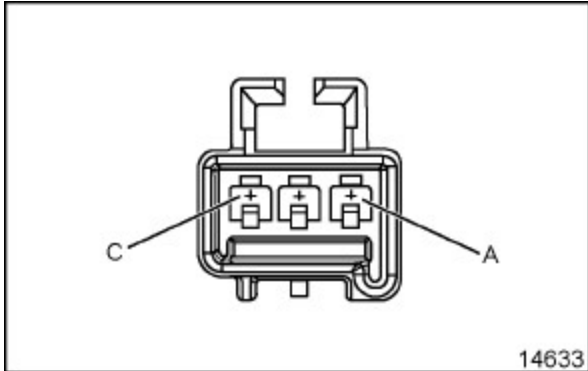
Inline Harness Connector C104M

							
Connector Part Information		<ul style="list-style-type: none"> • 12065172 • 1-Way F Weather Pack MP 280 		Connector Part Information		<ul style="list-style-type: none"> • 12065171 • 1-Way M Weather Pack MP 280 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	8008	Voltmeter Voltage	A	BRN	8008	Voltmeter Voltage

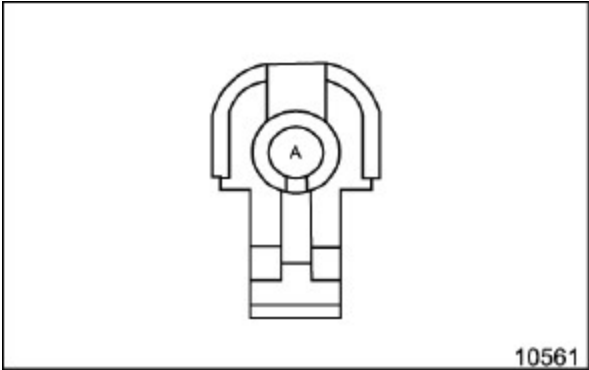
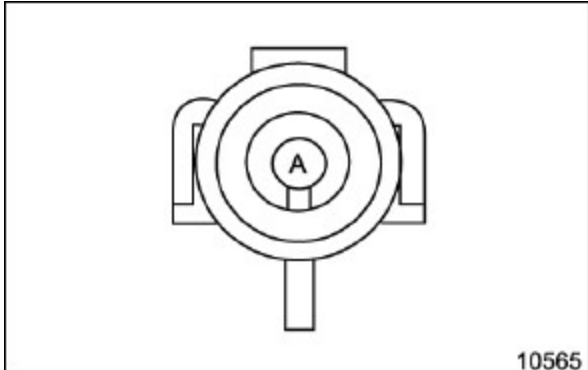
Inline Harness Connector C105M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129136 • 4-Way F Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129135 • 4-Way M M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	WHT	1080	Park Lamps	A	WHT	1080	Park Lamps
B	BLK/WHT	1969	Head Lamps (Hi Beam)	B	BLK/WHT	1969	Head Lamps (Hi Beam)
C	PNK/WHT	1970	Head Lamp (Low Beam)	C	PNK/WHT	1970	Head Lamp (Low Beam)
D	PNK	639	Turn Signals	D	PNK	639	Turn Signals

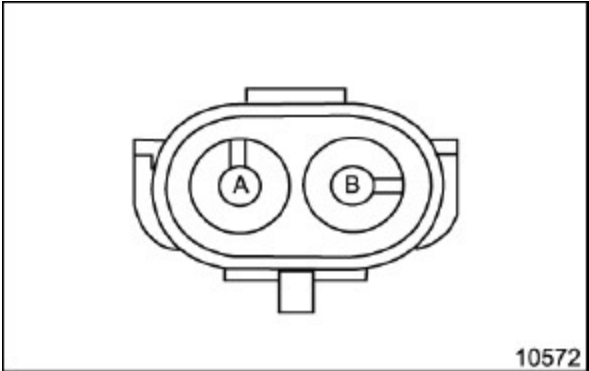
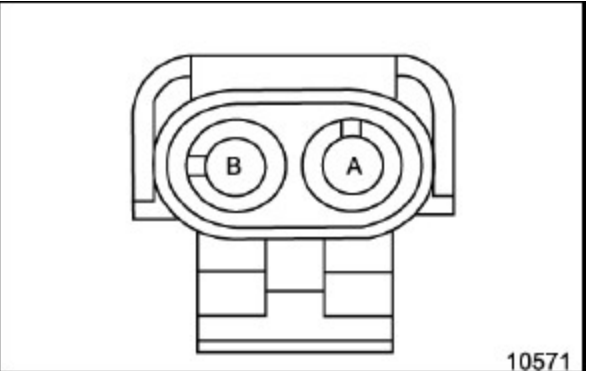
Inline Harness Connector C106M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129489 • 3-Way F M/P Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129490 • 3-Way M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	LT GRN/BLK	592	DRL	A	LT GRN/BLK	592	DRL
B	DK GRN	1329	Horn	B	DK GRN	1329	Horn
C	ORN	304	Radio	C	ORN	304	Radio

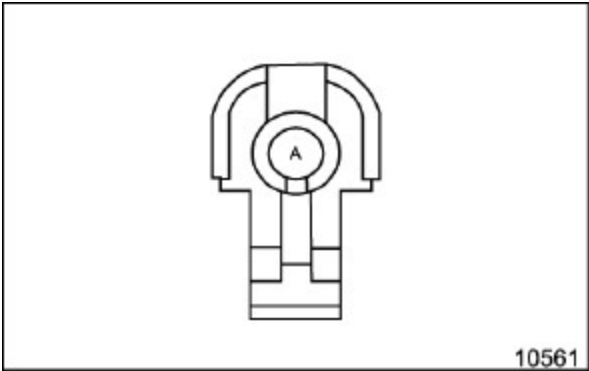
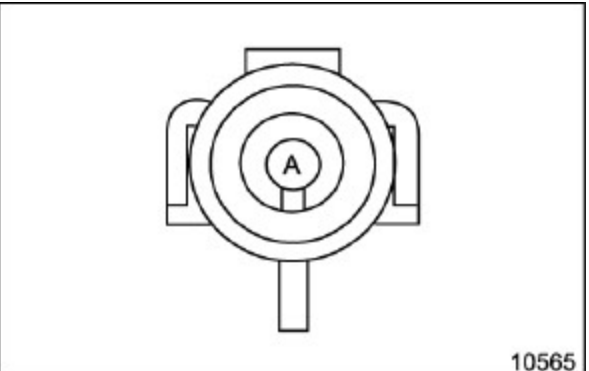
Inline Harness Connector C107M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	ORN	912	Power to Relay Module	A	ORN	912	Power to Relay Module

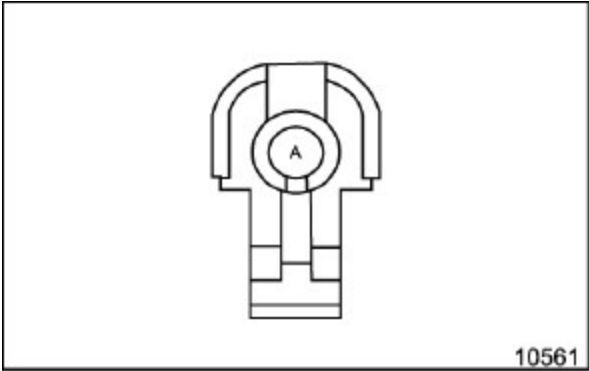
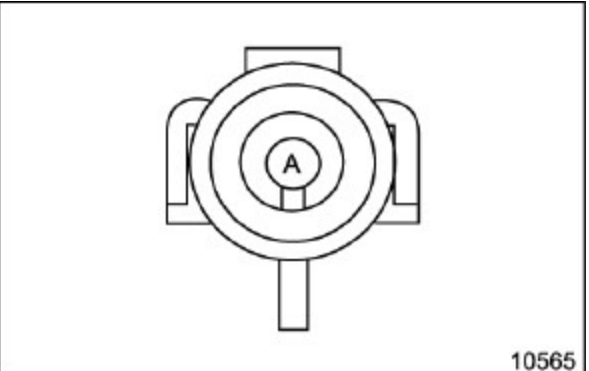
Inline Harness Connector C108M

							
Connector Part Information		<ul style="list-style-type: none"> • 12105792 • 2-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010973 • 2-Way M Weather Pack TWR (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	900	Rear Marker Lamp Voltage	A	BRN/WHT	900	Rear Marker Lamp Voltage
B	DK GRN/WHT	902	Rear Stop lamp Voltage	B	DK GRN/WHT	902	Rear Stop lamp Voltage

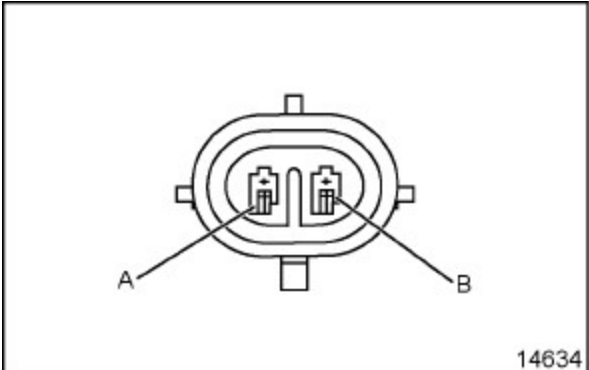
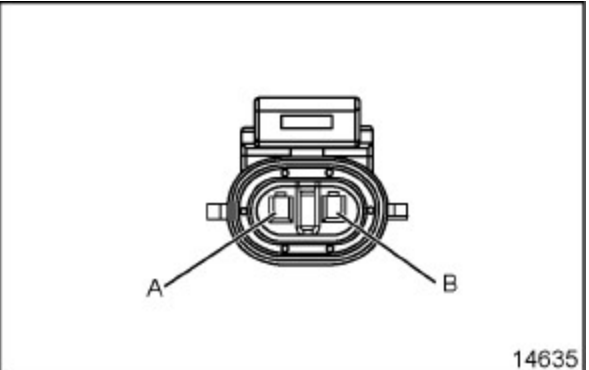
Inline Harness Connector C109M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	RED	802	24V Generator	A	RED	802	24V Generator

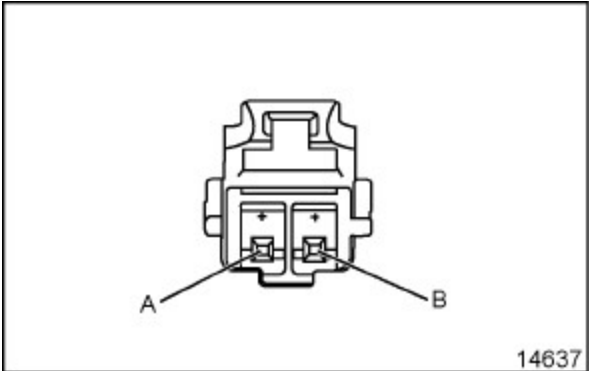
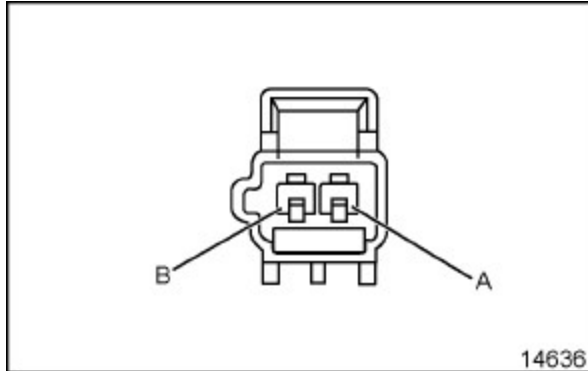
Inline Harness Connector C110M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	RED	802	24V Generator	A	RED	802	24V Generator

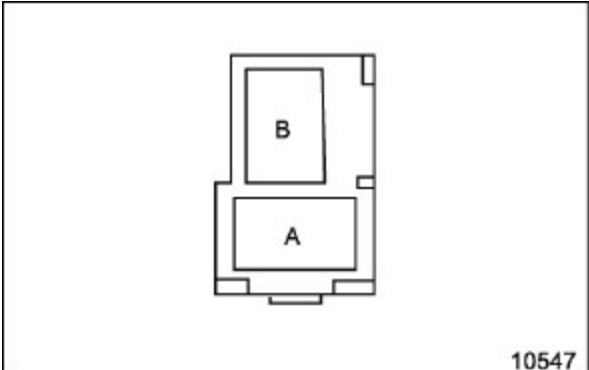
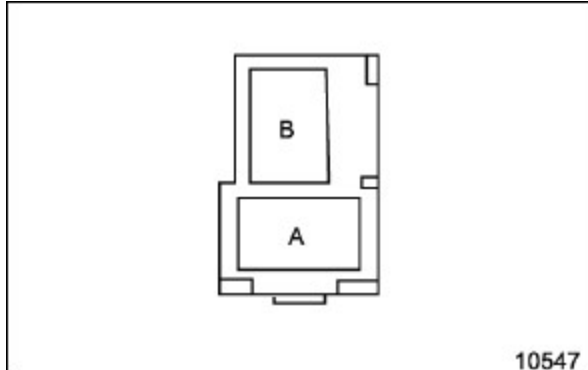
Inline Harness Connector C301M

							
Connector Part Information		<ul style="list-style-type: none"> • 12052641 • 2-Way F M/P 150 Series 		Connector Part Information		<ul style="list-style-type: none"> • 12162000 • 2-Way M M/P 150 Series 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	803	To Rear Topper Dome Switch	A	BRN	800	From Front Topper Dome Switch
B	BRN	800	To Rear Topper Dome Switch	B	BRN/WHT	803	From Front Topper Dome Switch

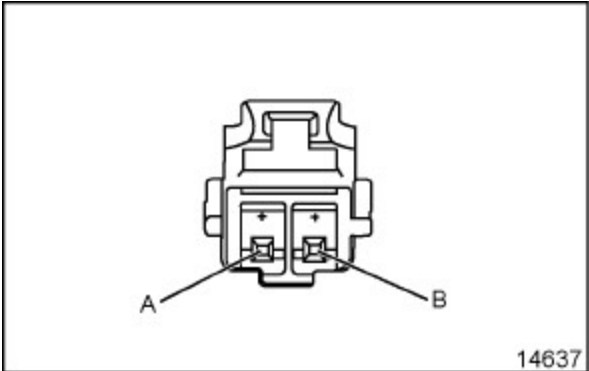
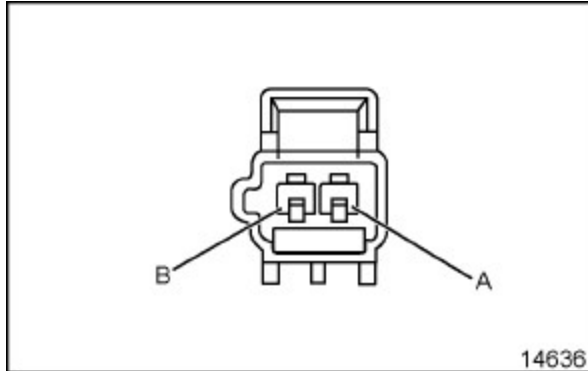
Inline Harness Connector C302M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129081 • 2-Way F Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129155 • 2-Way M M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	WHT	17	Brake Light Switch	A	WHT	17	Blackout (B/O) Service Switch
B	—	—	Not Used	B	—	—	Not Used

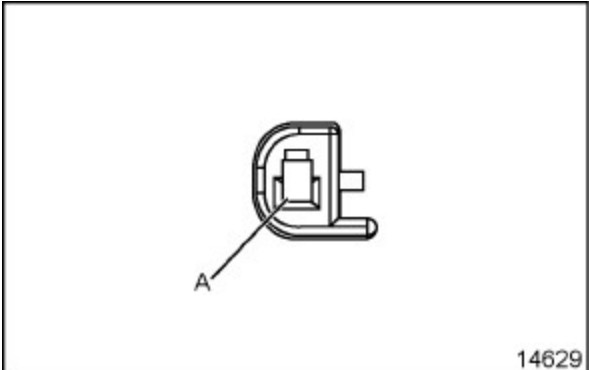
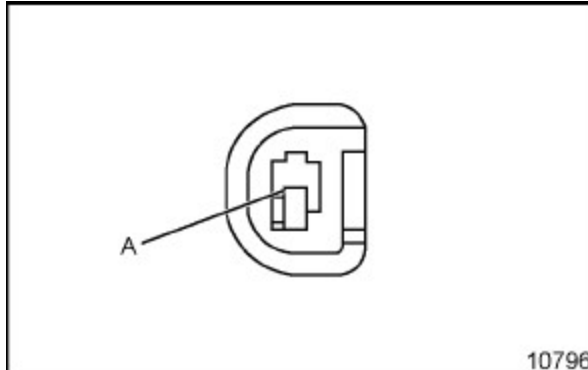
Inline Harness Connector C304M

							
Connector Part Information		<ul style="list-style-type: none"> • 02973781 • 2-Way F Series 280 (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 02984883 • 2-Way M Series 280 (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	8008	Voltmeter Feed	A	BRN	8008	Voltmeter Feed
B	BLK	150	Ground	B	BLK	150	Ground

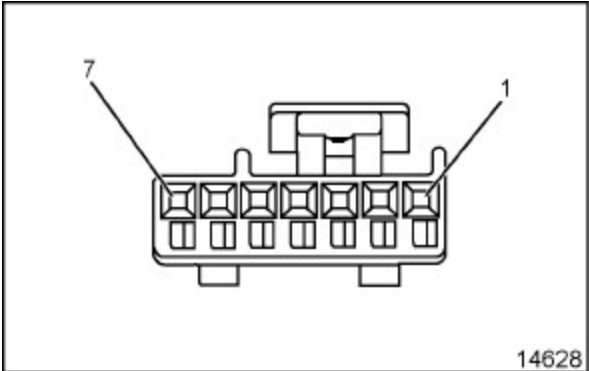
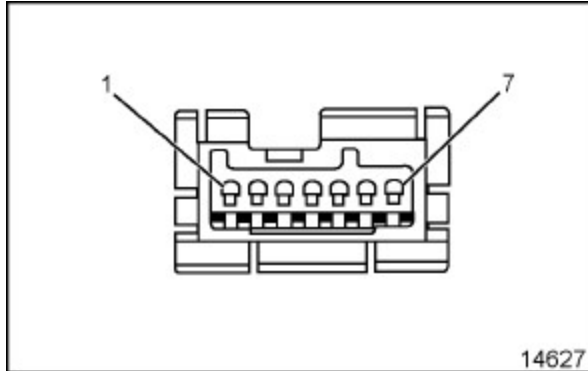
Inline Harness Connector C305M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129081 • 2-Way F Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129155 • 2-Way M M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	GRY/BLK	690	CTSY Supply Voltage	A	GRY/BLK	690	CTSY Supply Voltage
B	ORN/BLK	1732	Inadvertent Power Supply Voltage	B	ORN/BLK	1732	Inadvertent Power Supply Voltage

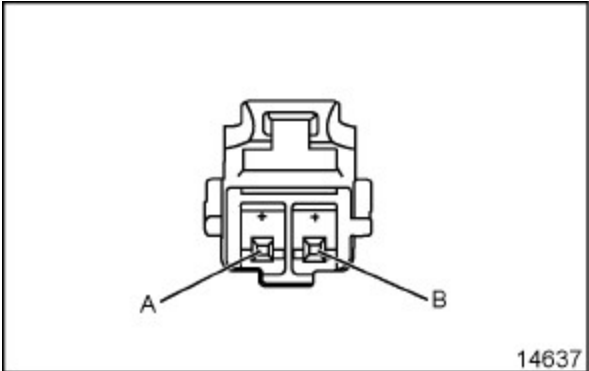
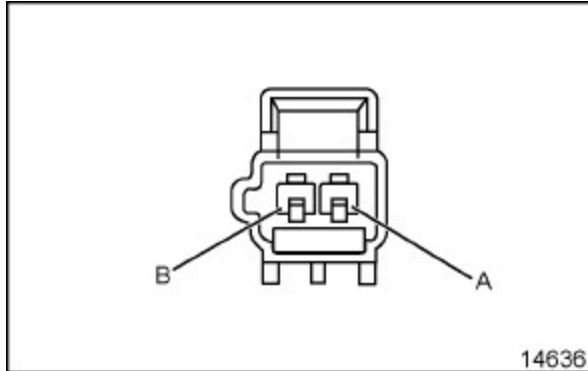
Inline Harness Connector C306M

							
Connector Part Information		<ul style="list-style-type: none"> • 12047682 • 1-Way F M/P 150 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12047683 • 1-Way M M/P 150 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	LT GRN	24	Backup Lamp Supply Voltage	A	LT GRN	24	Backup Lamp Supply Voltage

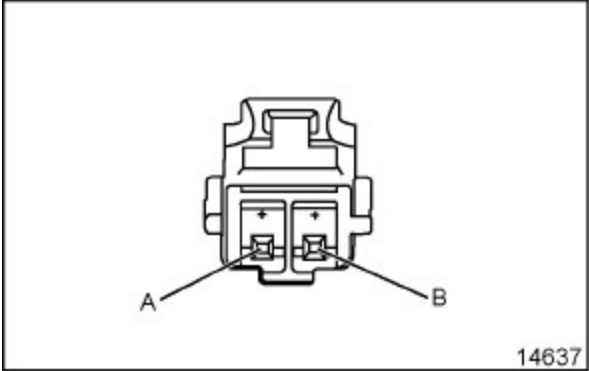
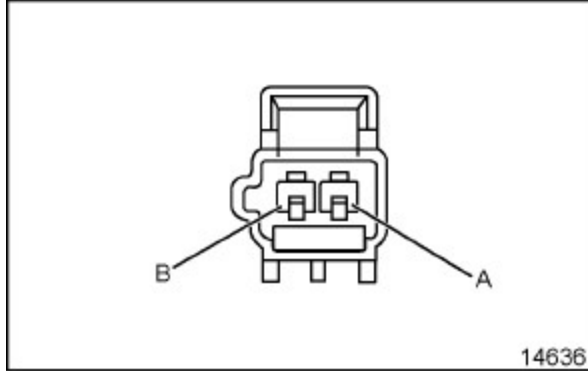
Inline Harness Connector C307M

							
Connector Part Information		<ul style="list-style-type: none"> • 12065873 • 7-Way F M/P 100 		Connector Part Information		<ul style="list-style-type: none"> • 12065874 • 7-Way M M/P 100 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
1	GRY	1056	Dimmer Switch 5V Reference Voltage from Dimming Relay	1	GRY	1056	Dimmer Switch 5V Reference Voltage from Dimming Relay
2	ORN/BLK	2090	Dimmer Switch Signal from Dimming Relay	2	ORN/WHT	2090	Dimmer Switch Signal from Dimming Relay
3	GRY/BLK	2226	Dimmer Switch Low Reference from Dimming Relay	3	GRY/BLK	2226	Dimmer Switch Signal from Dimming Relay
4	—	—	Not Used	4	—	—	Not Used
5	GRY	1056	Dimmer Switch 5V Reference Voltage from BCM	5	GRY	1056	Dimmer Switch 5V Reference Voltage from BCM
6	YEL/BLK	2090	Dimmer Switch Signal from BCM	6	YEL/BLK	2090	Dimmer Switch Signal from BCM
7	GRY/BLK	2226	Dimmer Switch Signal from BCM	7	GRY/BLK	2226	Dimmer Switch Signal from BCM

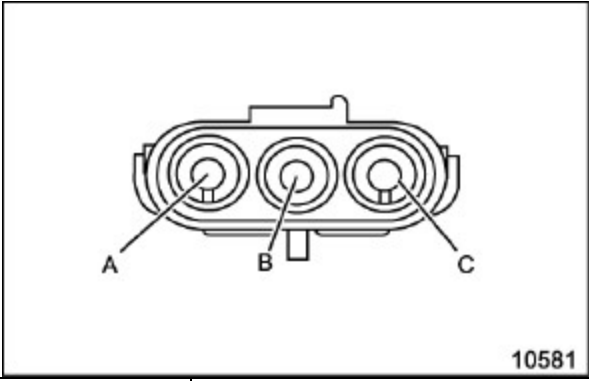
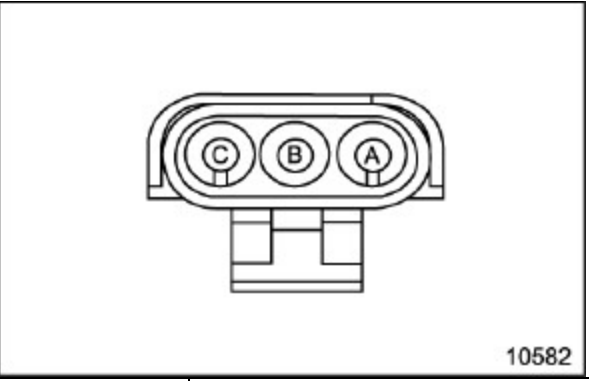
Inline Harness Connector C308M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129081 • 2-Way F Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129155 • 2-Way M M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	RED	912	Blackout (B/O) Service Switch Voltage	A	ORN	912	Blackout (B/O) Service Switch Voltage
B	BLK	150	Ground	B	BLK	150	Ground

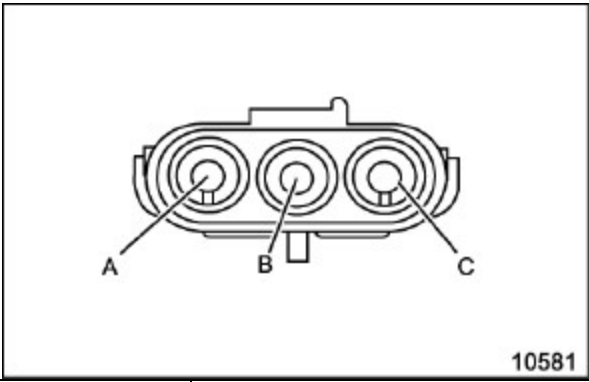
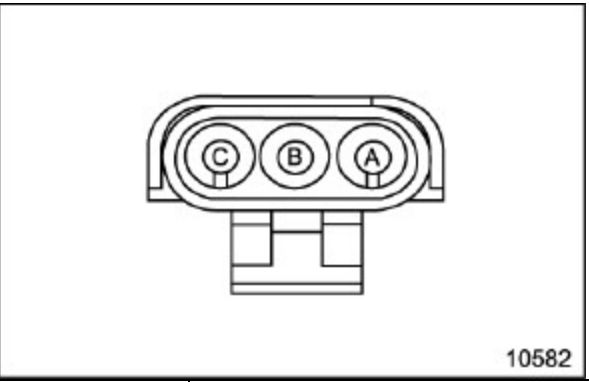
Inline Harness Connector C309M

							
Connector Part Information		<ul style="list-style-type: none"> • 12129081 • 2-Way F Flex-Lock 280 Series (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12129155 • 2-Way M M/P 280 Series (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	RED	912	Dimming Relay Voltage	A	RED	912	Dimming Relay Voltage
B	BLK	150	Ground	B	BLK	150	Ground

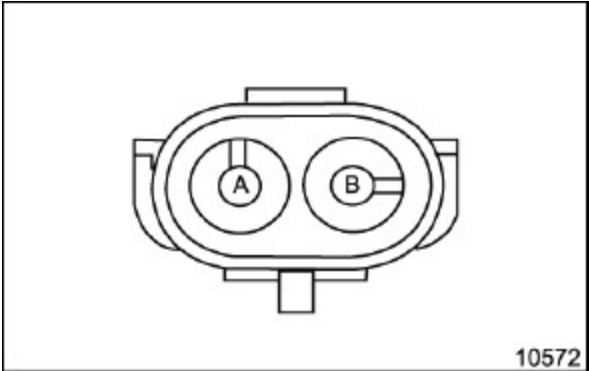
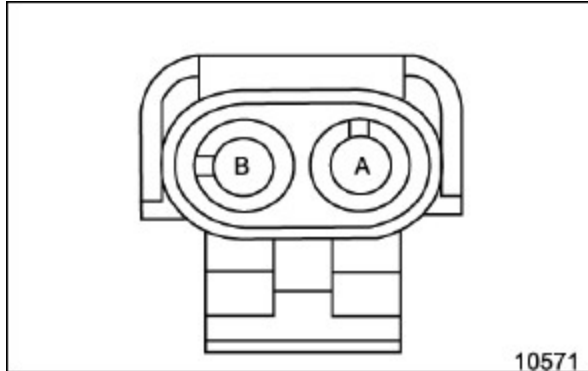
Inline Harness Connector C900M

 <p style="text-align: right;">10581</p>				 <p style="text-align: right;">10582</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12010717 • 3-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12015793 • 3-Way M Weather Pack TWR (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	30	Blackout (B/O) Marker Lamps	A	BRN	900	Blackout (B/O) Marker Lamps
B	YEL	18	S/T Lamp Feed (Left)	B	YEL	18	S/T Lamp Feed (Left)
C	BLK	150	Ground	C	BLK	150	Ground

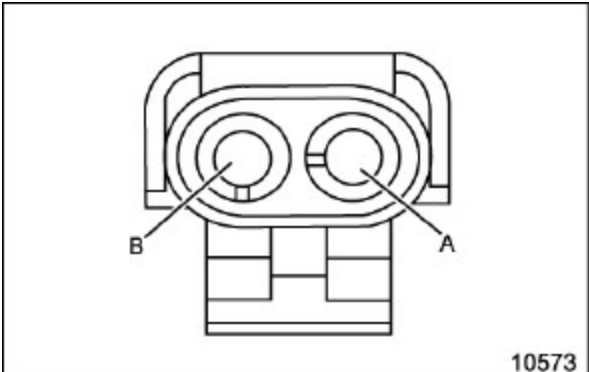
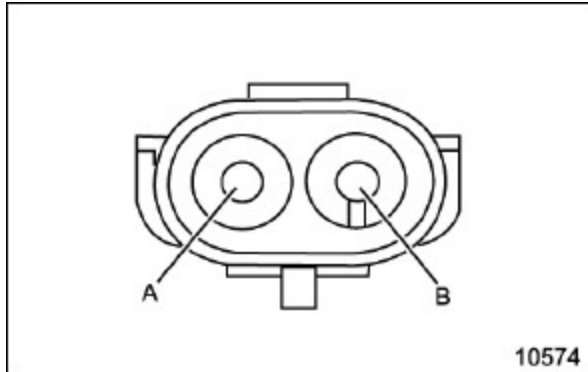
Inline Harness Connector C901M

 <p style="text-align: right;">10581</p>				 <p style="text-align: right;">10582</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12010717 • 3-Way F Weather Pack SHD (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12015793 • 3-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	9	Park Lamp Feed	A	BRN	9	Park Lamp Feed
B	DK GRN	902	Blackout (B/O) Stop Lamps	B	GRN	902	Blackout (B/O) Stop Lamps
C	DK GRN	19	S/T Lamps (Right)	D	DK GRN	19	S/T Lamps (Right)

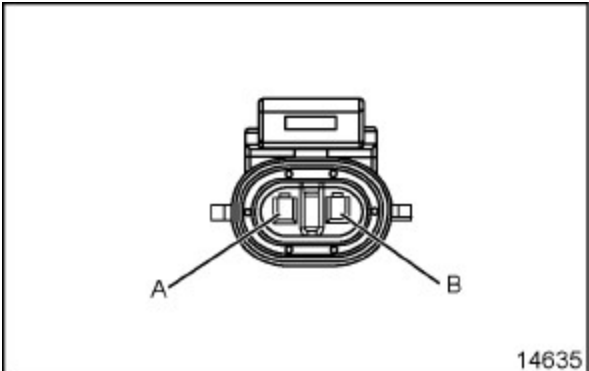
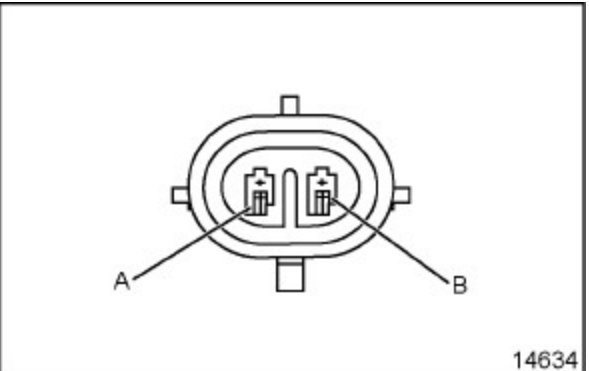
Inline Harness Connector C902M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015792 • 2-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010973 • 3-Way M Weather Pack TWR (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	DK GRN/ WHT	902	Right Rear Blackout (B/O) Stop Lamps	A	DK GRN/ WHT	902	Right Rear Blackout (B/O) Stop Lamps
B	BRN/WHT	900	Right Rear Blackout (B/O) Marker Lamps	B	BRN/WHT	900	Right Rear Blackout (B/O) Marker Lamps

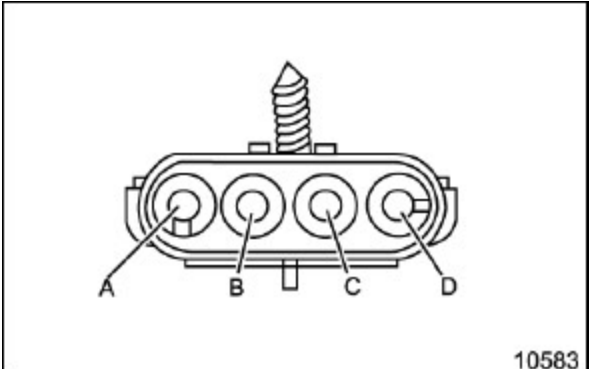
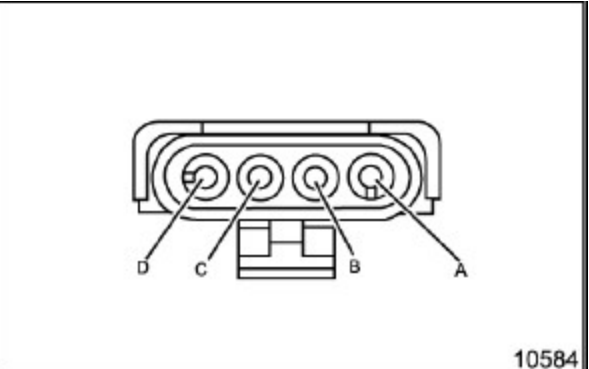
Inline Harness Connector C903M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015792 • 2-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010973 • 2-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	DK GRN/ WHT	902	Left Rear Blackout (B/O) Stop Lamps	A	DK GRN/ WHT	902	Left Rear Blackout (B/O) Stop Lamps
B	BRN/WHT	900	Left Rear Blackout (B/O) Marker Lamps	B	BRN/WHT	900	Left Rear Blackout (B/O) Marker Lamps

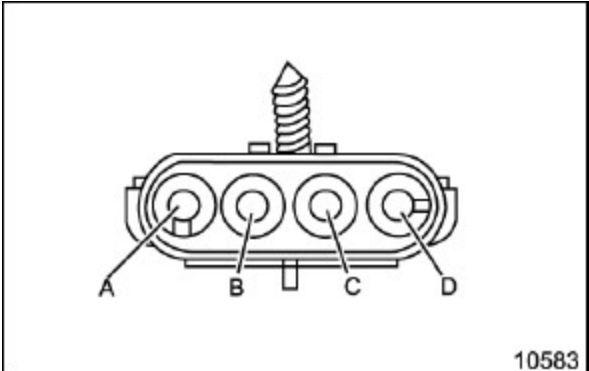
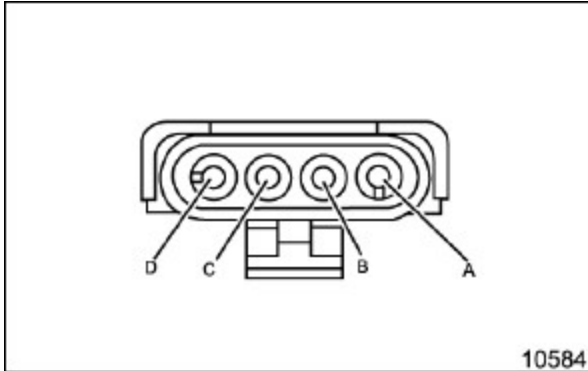
Inline Harness Connector C904M

							
Connector Part Information		<ul style="list-style-type: none"> • 12052641 • 2-Way F MP 150 Series 		Connector Part Information		<ul style="list-style-type: none"> • 12162000 • 2-Way M MP 150 Series 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BLK	1050	CHML Voltage	A	RED	1620	CHML Voltage
B	BLU	1050	Ground	B	BLK	1050	Ground

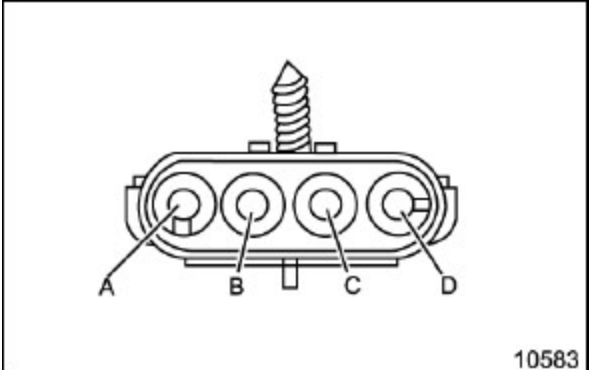
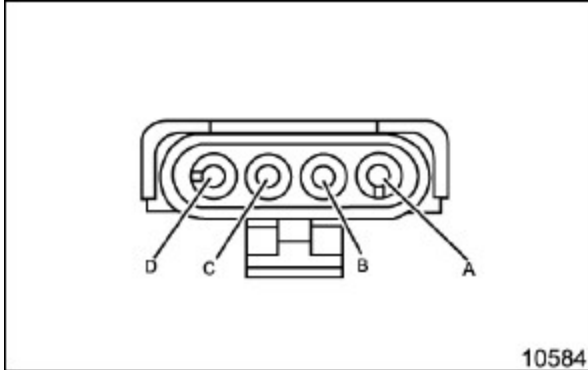
Inline Harness Connector C905M

							
Connector Part Information		<ul style="list-style-type: none"> • 12020832 • 4-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12020830 • 4-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	915	Park Lamps	A	BRN	9	Park Lamps
B	YEL	18	S/T Lamps (Left)	B	YEL	18	S/T Lamps (Left)
C	BLK	19	Ground	C	BLK	150	Ground
D	GRN	916	S/T Lamps (Right)	D	DK GRN	19	S/T Lamps (Right)

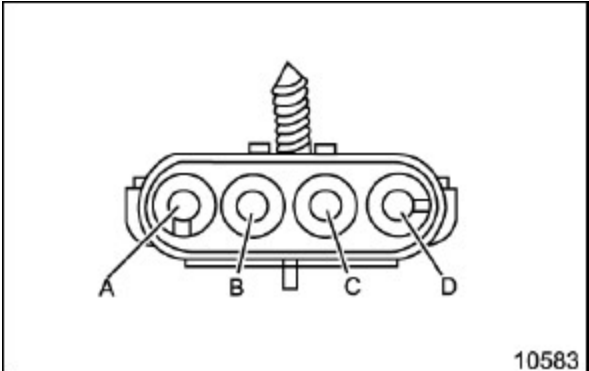
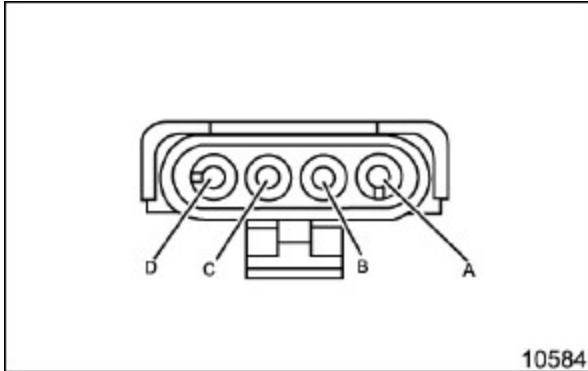
Inline Harness Connector C906M

							
Connector Part Information		<ul style="list-style-type: none"> 12020832 4-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> 12020830 4-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	2109	Park Lamps	A	BRN	2109	Park Lamps
B	YEL	1618	S/T Lamps (Left)	B	YEL	1618	S/T Lamps (Left)
C	BLK	1750	Ground	C	BLK	1750	Ground
D	DK GRN	1619	S/T Lamps (Right)	D	DK GRN	1619	S/T Lamps (Right)

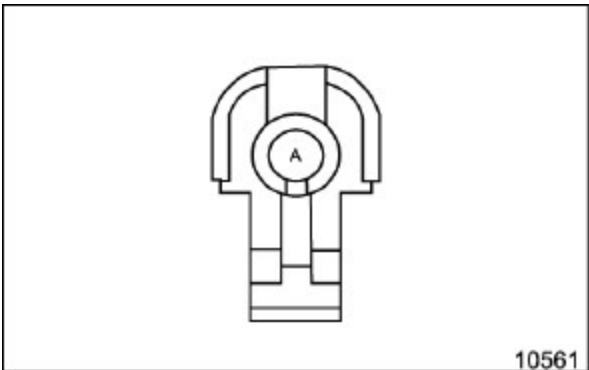
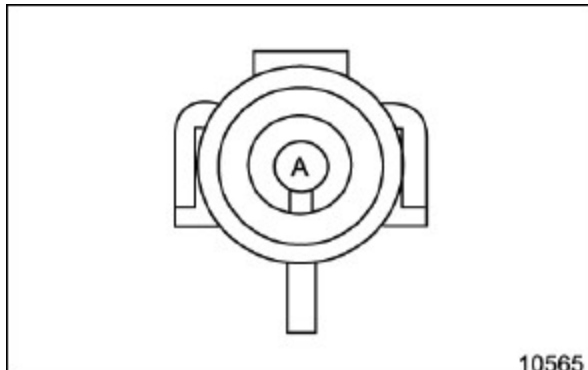
Inline Harness Connector C907M

							
Connector Part Information		<ul style="list-style-type: none"> 12020832 4-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> 12020830 4-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	2109	Park Lamps	A	BRN	2109	Park Lamps
B	YEL	1618	S/T Lamps (Left)	B	YEL	1618	S/T Lamps (Left)
C	BLK	1750	Ground	C	BLK	1750	Ground
D	DK GRN	1619	S/T Lamps (Right)	D	DK GRN	1619	S/T Lamps (Right)

Inline Harness Connector C908M

							
Connector Part Information		<ul style="list-style-type: none"> • 12020832 • 4-Way F Weather Pack TWR (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12020830 • 4-Way M Weather Pack SHD (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	BRN	9	Park Lamps	A	BRN	915	Park Lamps
B	YEL	18	S/T Lamps (Left)	B	YEL	18	S/T Lamps (Left)
C	BLK	150	Ground	C	BLK	19	Ground
D	DK GRN	19	S/T Lamps (Right)	D	GRN	916	S/T Lamps (Right)

Inline Harness Connector C909M

							
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 		Connector Part Information		<ul style="list-style-type: none"> • 12010996 • 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function	Pin	Wire Colour	Circuit No.	Function
A	RED	87	Power to Trailer Relays	A	RED	802	Power to Trailer Relays

Repair Instructions

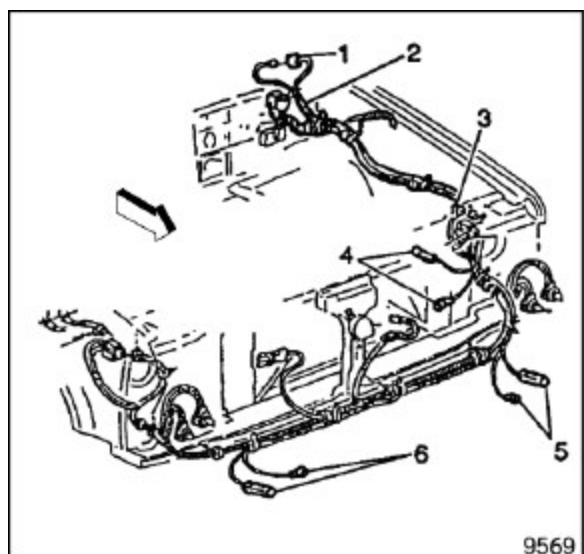
Auxiliary Lamp Harness Replacement - Front

Removal Procedure

1. Remove the radiator grille.
2. Remove the filler panel.
3. Trace the auxiliary harness connections to the original harness.

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

4. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

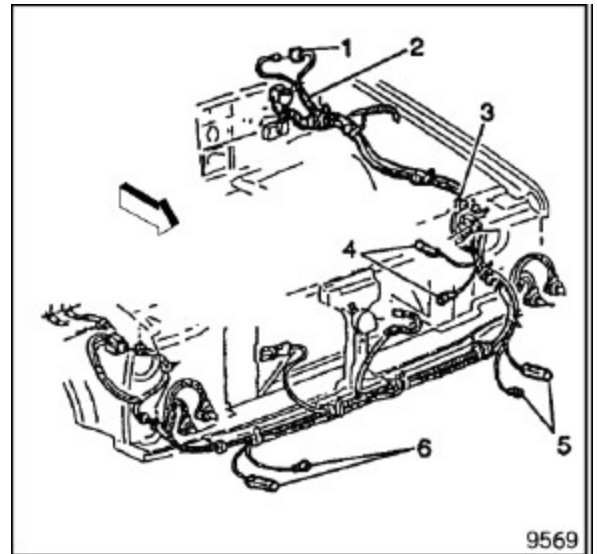


5. Remove the connector from the right hand blackout (B/O) marker lamp (6) and the left hand blackout (B/O) marker lamp (5) and the ground nut to the ground lead and all tie wraps connecting the auxiliary harness.
6. Remove connector (4) and ground from blackout (B/O) headlamp mounting stud.
7. Trace the auxiliary harness under the washer fluid reservoir and remove the tie wrap along the fender interior.
8. Trace the auxiliary harness under the battery tray area and remove the wrap.
9. Remove the forward auxiliary harness (2) from the vehicle.
10. Remove the tie wraps near the bulkhead and disconnect the forward connector of the auxiliary harness from the auxiliary IP harness connector and tie wrap holding it to the harness connector.

Installation Procedure

1. Connect the forward connector of the auxiliary harness to the auxiliary IP harness connector and attach the tie wraps.
2. Install the forward auxiliary harness (2) to the vehicle.
3. Install the auxiliary harness under the battery tray area and install the tie wrap.
4. Install the auxiliary harness under the washer fluid reservoir area and install the tie wrap along the fender interior.
5. Install the connector to the right hand blackout (B/O) marker lamp (6) and the left hand blackout (B/O) marker lamp (5) and the ground nut to the ground lead and all tie wraps connecting the auxiliary harness.

6. Install connector (4) and the ground to blackout (B/O) headlamp mounting stud.
7. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
8. Install the filler panel.
9. Install the auxiliary harness connections to the original harness.
10. Install the radiator grille.

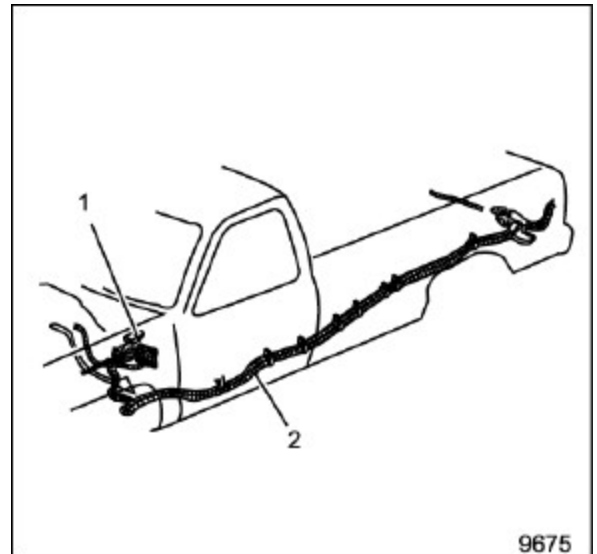


Auxiliary Lamp Extension Harness Replacement – Rear

Removal Procedure

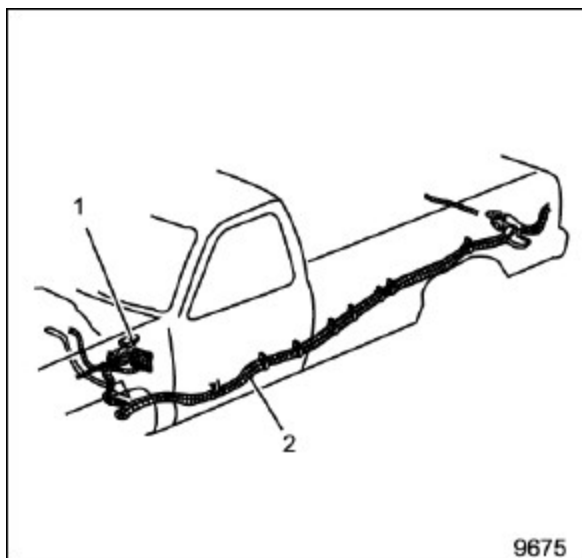
Caution: Refer to Battery Disconnect Caution in Cautions and Notices.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Access the auxiliary rear lamp extension harness from the engine compartment at the left side of the bulkhead.
3. Remove the connector (1) from the IP auxiliary harness and tie wrap connecting to the forward lamp harness.



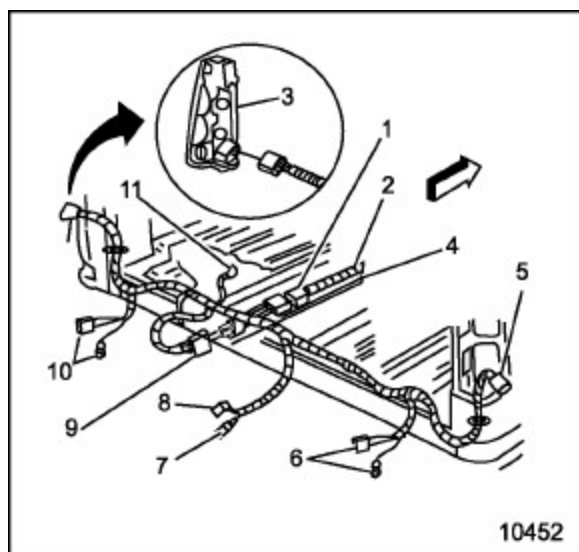
Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

4. Raise and support the vehicle on a hoist and trace the auxiliary rear lamp harness extension along the path of the existing harness and vehicle frame.
5. Remove the connector to the rear lamp harness.



Installation Procedure

1. Install the connector to the rear lamp harness.
2. Remove supports and lower the vehicle and install the auxiliary rear lamp harness extension along the path of the existing harness and vehicle frame.
3. Install the connector (1) to the IP auxiliary harness and tie wrap holding to the forward lamp harness.
4. Install the auxiliary rear lamp extension harness to the engine compartment location at the left side of the bulkhead.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.



Lamp Harness Replacement – Rear

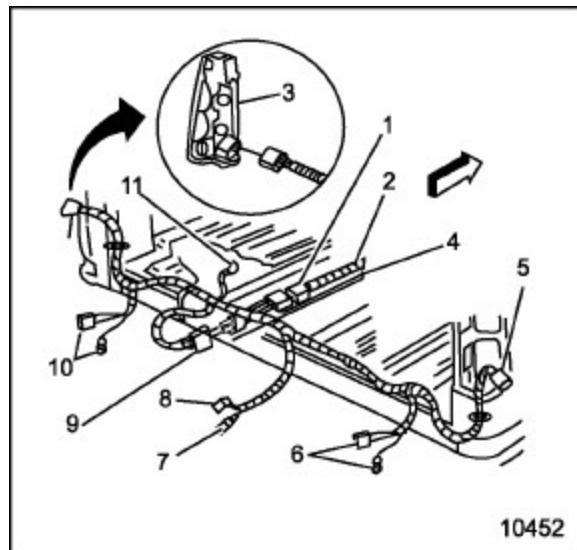
Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the rear lamp harness connector from the left tail lamp connector.
3. Remove the ground lead and connector for the left blackout (B/O) marker lamp.
4. Remove the vehicle ground lead bolt, washer and harness ground.
5. Remove the rear lamp harness connector from the auxiliary rear lamp extension harness.
6. Remove the rear lamp harness connector from the rear lamp extension harness.
7. Remove the two rear lamp harness connectors (7, 8) from the trailer jumper.
8. Remove the ground lead nut, ground lead and connector from the right blackout (B/O) marker lamp.
9. Remove the rear lamp harness connector from the right and left taillamp connectors.

Installation Procedure

1. Install the rear lamp harness connector to the right and left taillamp connectors.
2. Install the ground lead nut, ground lead and connector to the right blackout (B/O) marker lamp.
3. Install the two-rear lamp harness connectors (7, 8) to the trailer jumper.
4. Install the rear lamp harness connector to the auxiliary rear lamp extension harness.
5. Install the vehicle ground lead bolt, washer and harness ground.



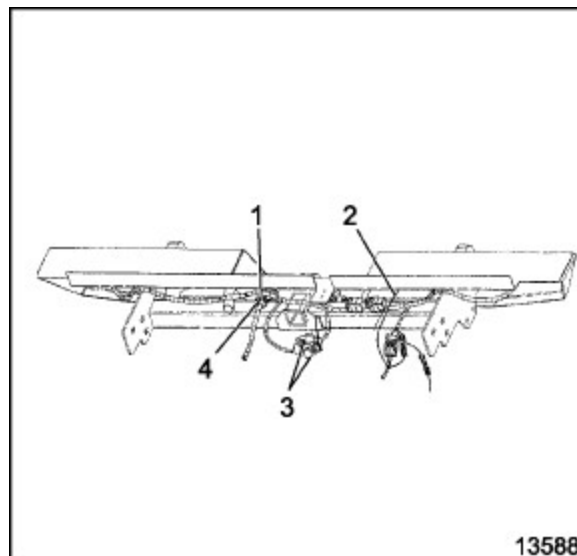
6. Install the ground lead and connector for the left blackout (B/O) marker lamp.
7. Install the rear lamp harness connector to the left taillamp connector.
8. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

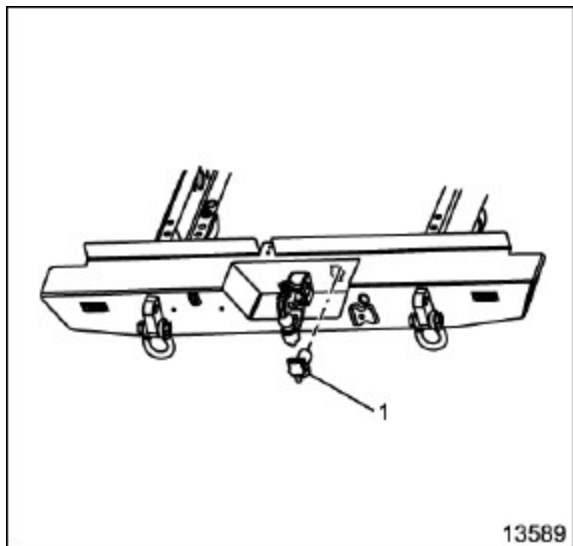
Commercial Trailer Connector Replacement

Removal Procedure

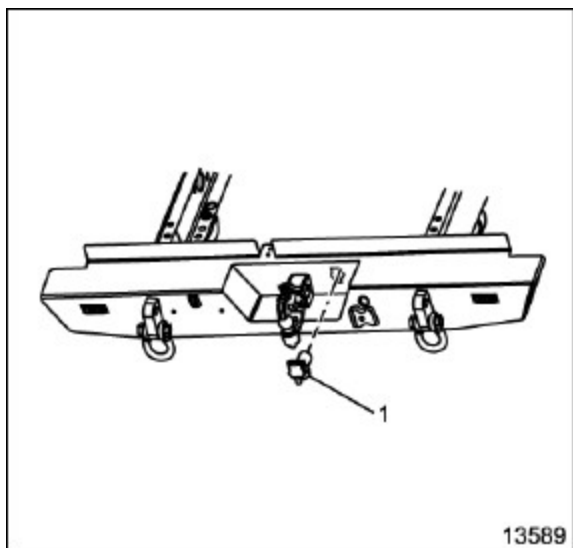
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Disconnect harness connector (4) from the trailer connectors (1).



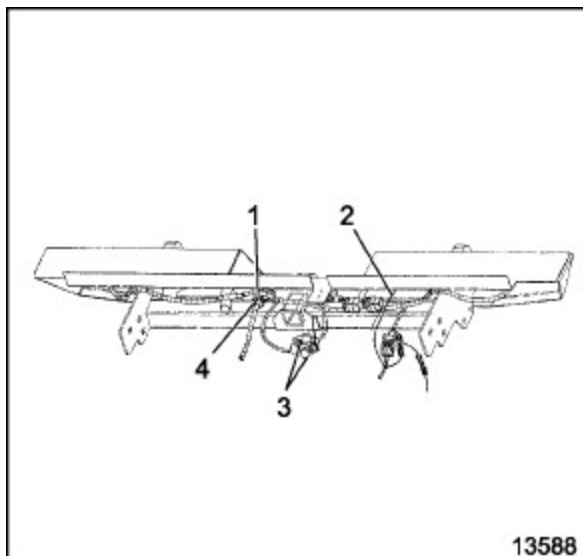


3. Release the lock table, turn connector (1) and pull out from bumper.



Installation Procedure

1. Install connector (1) into opening in bumper.
2. Turn connector until lock tabs engage.



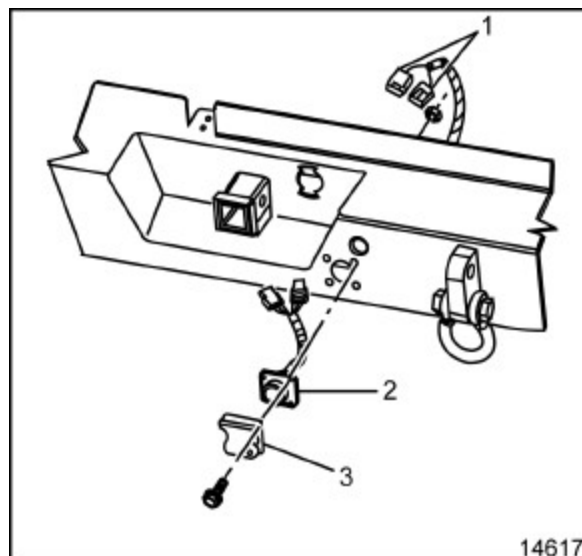
3. Connect harness connector (4) into the trailer lamp connector (1).
4. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

Military Trailer Connector Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Disconnect the trailer harness connectors (1).
3. Remove the 4 nuts and bolts securing the connector to the bumper.
4. Remove the cover (3) and trailer connector (2).



Installation Procedure

1. Install the trailer connector (2) and cover (3) onto the bumper.

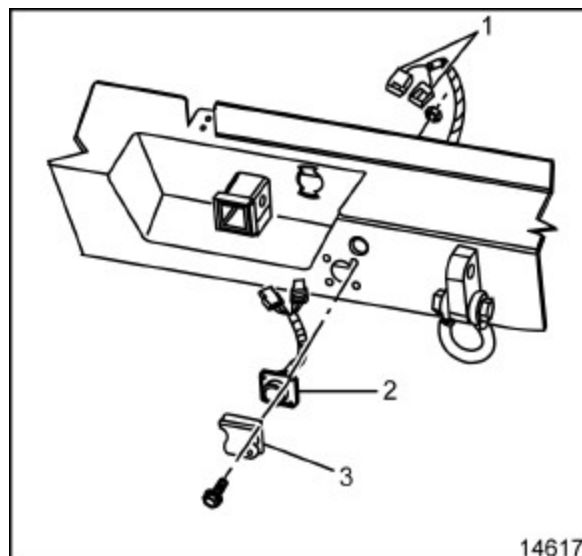
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the 4 bolts and nuts to secure the cover and connector to the bumper.

Tighten

Tighten connector bolts to 7 N•m (62 lb in).

3. Connect the harness connectors (1).
4. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

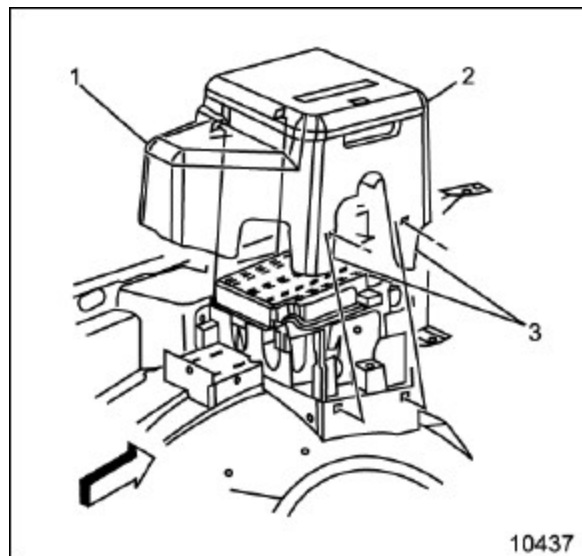


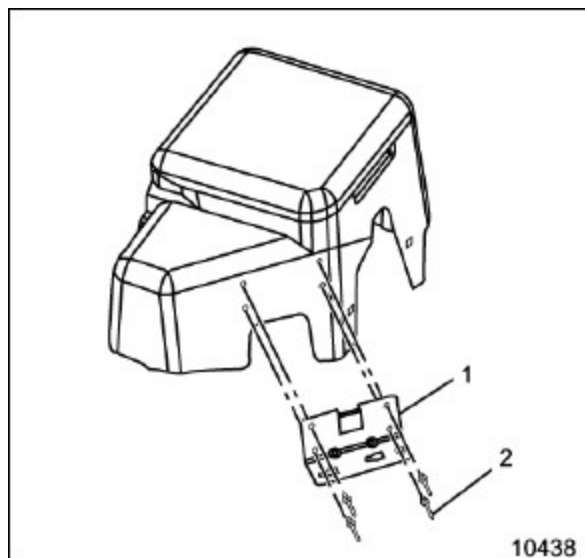
Relay Mounting Bracket Replacement

Removal Procedure

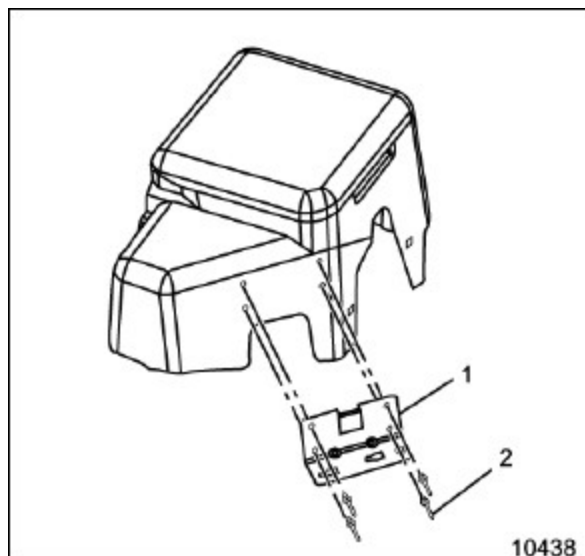
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the left fender upper brace.
3. Remove top cover (2).
4. Remove the electrical centre cover assembly (1) by lifting the cover outwards to clear the tabs (3).



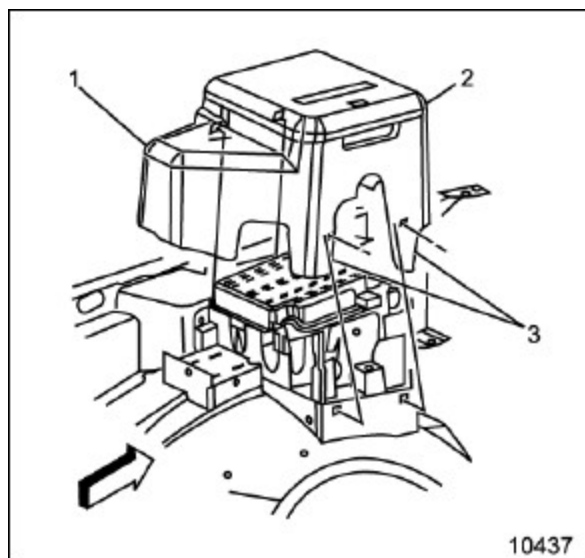


5. Drill out the rivets (2) and remove bracket (1).



Installation Procedure

1. Rivet the bracket (1) to the electrical centre cover.



2. Set the electrical centre block in its resting position until the tabs (3) lock into place.
3. Install the lower part of the cover (1).
4. Install the upper cover (2).
5. Install the fender upper brace.

Notice: Refer to Fastener Notice in Cautions and Notices.

6. Install the 4 fender upper brace bolts.

Tighten

Tighten the 4 retaining bolts to 25 N•m (18 lb ft).

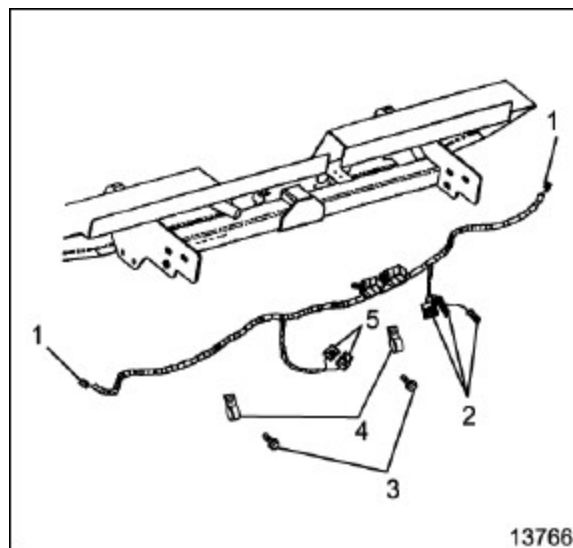
7. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

Blackout (B/O) and Trailer Harness Replacement - Rear

Removal Procedure

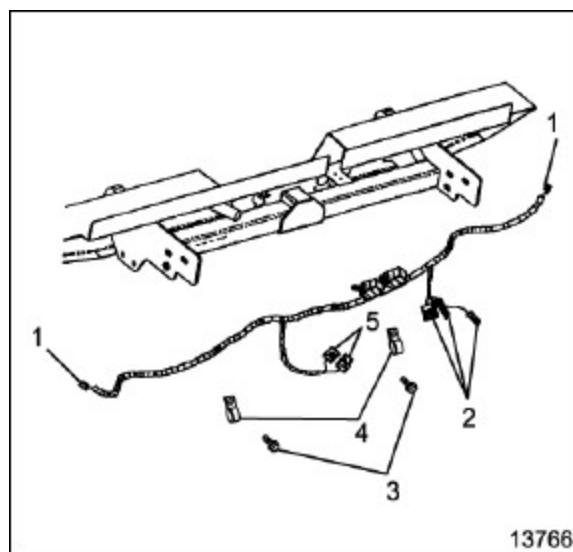
Caution: Refer to *Battery Disconnect Caution in Caution and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Disconnect the 2, 24V trailer harness connectors (5) from the 24V trailer connector harness.
3. Disconnect the 3 blackout (B/O) and trailer harness connectors (2).
4. Disconnect the 2 blackout (B/O) marker lamp connectors (1) from the blackout (B/O) marker lamps.
5. Remove the 2 bolts (3) and two clamps (4) from the blackout (B/O) and the trailer harness.
6. Remove the blackout (B/O) and the trailer harness from the bumper assembly.



Installation Procedure

1. Position the blackout (B/O) and the trailer harness onto the bumper in the same routing location as removed.
2. Install the 2 clamps (4) and the two bolts (3) to the blackout (B/O) and trailer harness.
3. Connect the 2 blackout (B/O) marker lamp connectors (1) to the blackout (B/O) marker lamps.
4. Connect the 3 blackout (B/O) and the trailer harness connectors (2).
5. Connect the 2, 24V trailer harness connectors (5) to the 24V trailer harness.
6. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

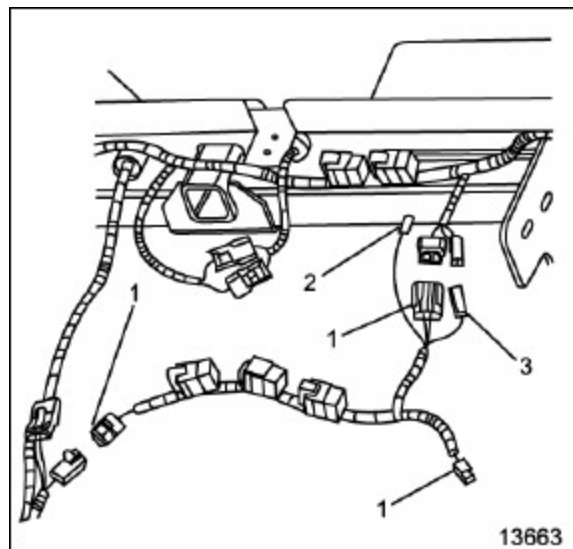


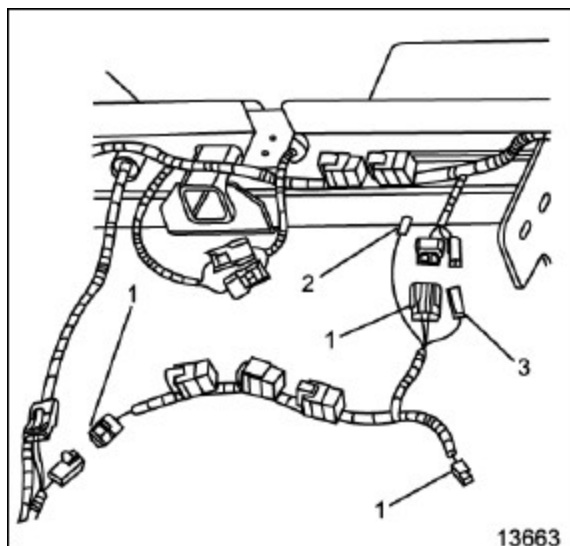
12V and 24V Harness Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Caution and Notices*.

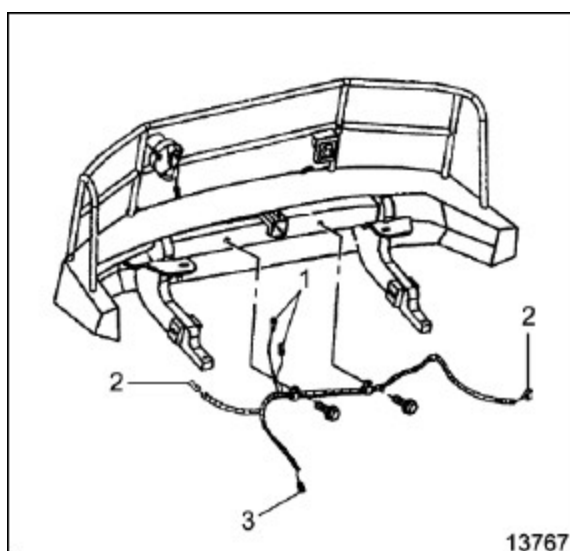
1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Disconnect the 12V and the 24V harness connector (1) from the blackout (B/O) and the trailer harness connectors.
3. Disconnect the license plate lamp connector (2) from the license plate lamp.
4. Disconnect the blackout (B/O) connector (3) from the blackout (B/O) and trailer harness connector.
5. Remove the 12V to 24V harness from the vehicle.





Installation Procedure

1. Install the 12V to 24V wiring harness in the same routing location as removed.
2. Connect the blackout (B/O) connector (3) from the 12V and 24V harness to the blackout (B/O) and trailer harness connector.
3. Connect the license plate lamp connector (2) from the 12V to 24V harness to the license plate lamp.
4. Connect the 12V to 24V harness connector (1) to the blackout (B/O) and the trailer harness connector.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

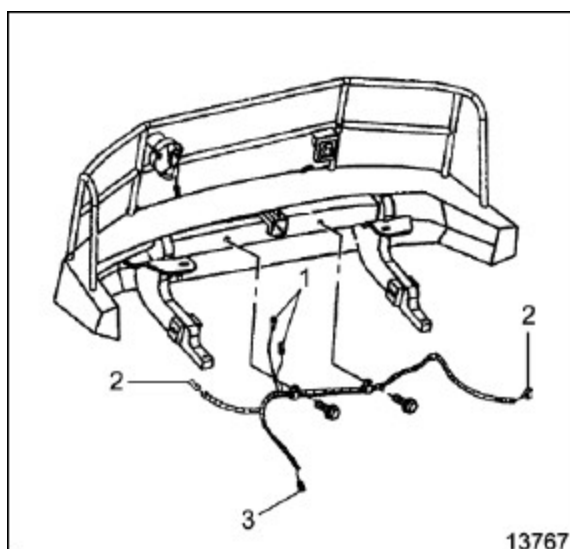


Blackout (B/O) Lamp Wiring Harness Replacement - Front

Removal Procedure

Caution: Refer to Battery Disconnect Caution in Caution and Notices.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Disconnect the blackout (B/O) headlamp connectors (1) from the blackout (B/O) headlamp.
3. Disconnect the blackout (B/O) marker lamp connectors (2) from the blackout (B/O) marker lamp.
4. Trace the blackout (B/O) lamp harness connector (3) to the main harness connector.
5. Disconnect the blackout (B/O) lamp harness connector (3) to the main harness connector.
6. Remove the wiring harness from the vehicle. Note routing wiring harness for installation.



Installation Procedure

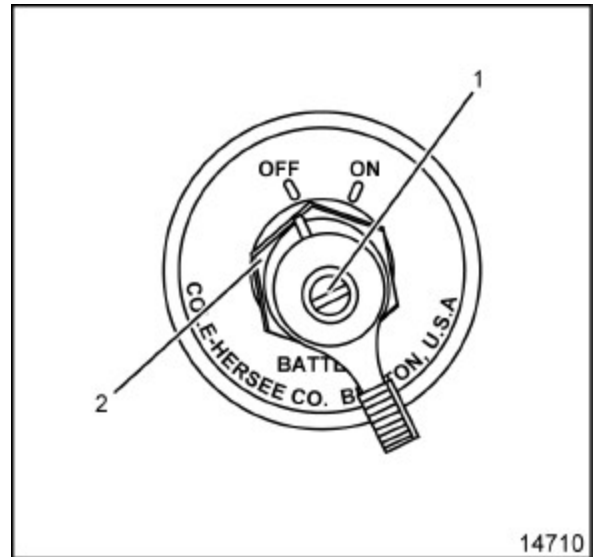
1. Position the blackout (B/O) lamp wiring harness onto the vehicle in the same routing location as removed.
2. Connect the blackout (B/O) lamp harness connector (3) to the main harness connector.
3. Connect the blackout (B/O) marker lamp connectors (2) to the blackout (B/O) marker lamps.
4. Connect the blackout (B/O) headlamp connectors (1) to the blackout (B/O) headlamp.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

Battery Cut Off Switch Replacement (Cable Layer)

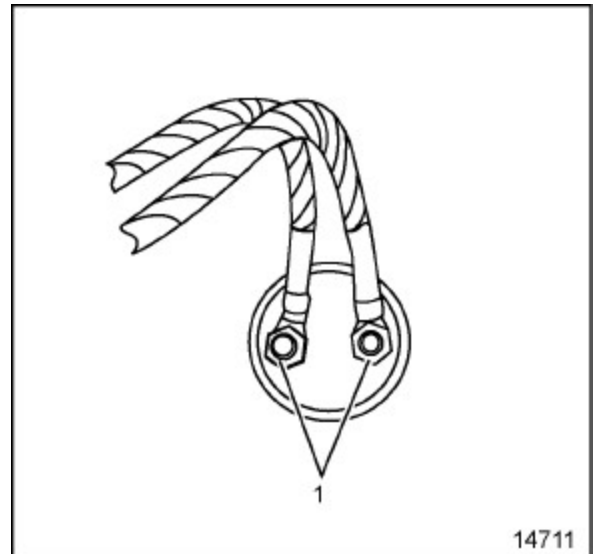
Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Caution and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the screw (1). Pull knob off switch.
3. Remove the nut (2) securing the switch to the bracket and remove the switch from bracket.

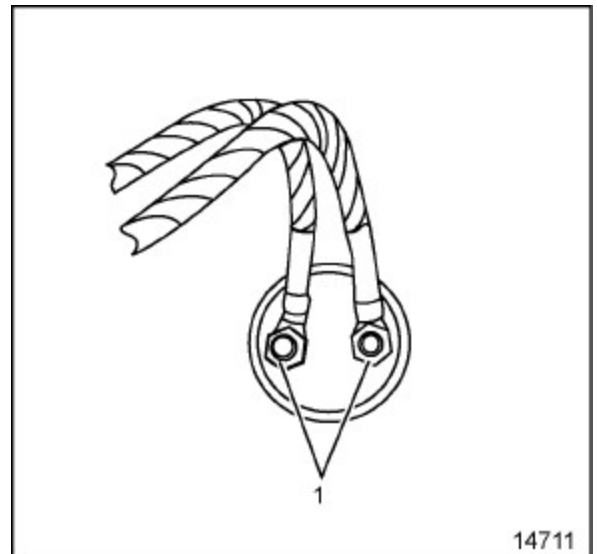


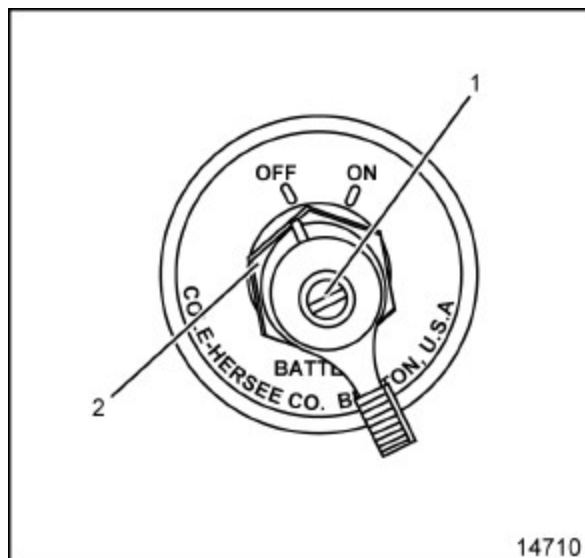
4. Remove the nuts (1) from the switch and remove cables.



Installation Procedure

1. Install the cable onto the switch and tighten nuts (1).





2. Install the switch into the bracket and install the nuts (2).
3. Install the knob and screw (1).
4. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

Description and Operation

Wiring Description

Several changes offered by the military options require new wiring configurations. Auxiliary wiring attaches to the original wiring providing power to the following items:

- Blackout (B/O) Lighting
- 24V System
- Battery Equalizer
- Circuit Breakers and Relays
- Radio Communications
- Navigation Systems
- Slave Receptacle

All auxiliary harnesses are outlined in schematics. Several are described in repair procedures in this manual.

Access to fuses can be found under the dash and under the hood.

Lighting Systems

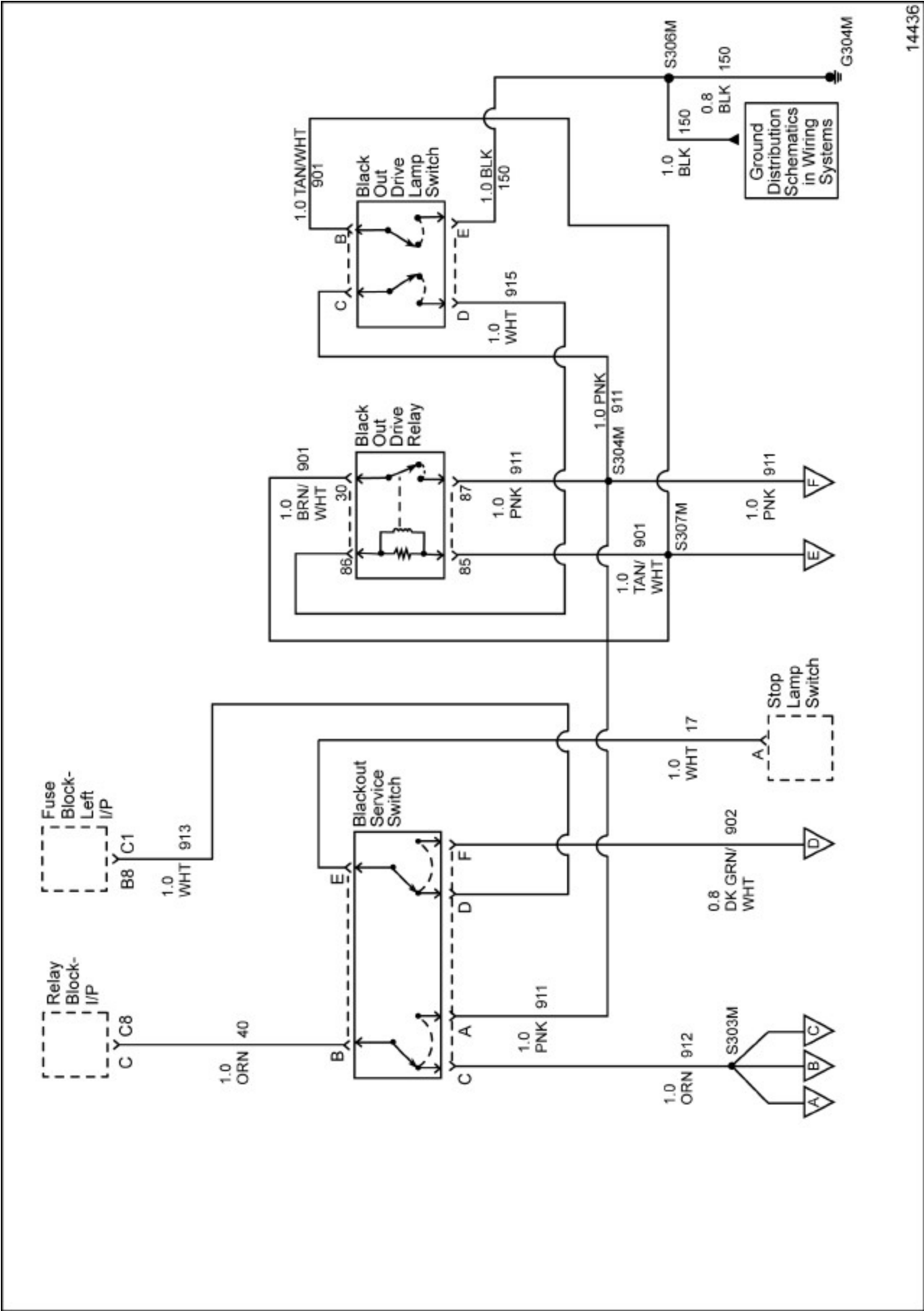
Specifications

Fastener Tightening Specifications

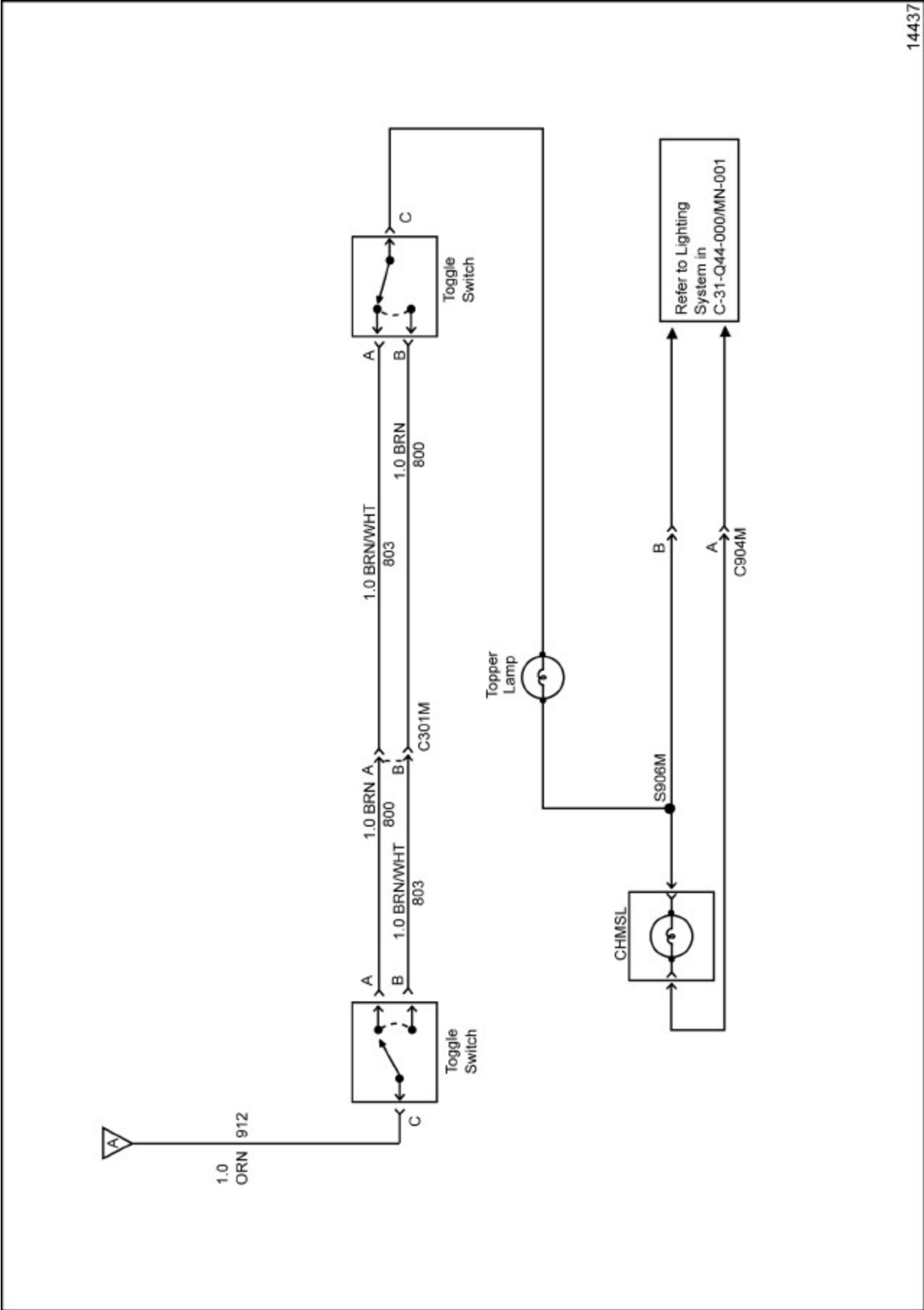
Application	Specification	
	Metric	English
Battery Cable Connections	17 N•m	13 lb ft
Beacon Lens Guard	7-11 N•m	5-8 lb ft
Beacon Mounting Bolts	7-11 N•m	5-8 lb ft
Blackout (B/O) Headlamp Stud Nut	10 N•m	7 lb ft
Cord Grip Dome Nut	2.50 N•m	22 lb in
Cord Grip Lock Nut	3.75 N•m	33 lb in
Front Blackout (B/O) Marker Lamp Nuts	2 N•m	18 lb in
Rear Blackout (B/O) Lamp Nuts	2 N•m	18 lb in
Taillamp Bracket to Bumper Nuts	27 N•m	20 lb ft
Taillamp to Bracket Nuts	28 N•m	21 lb ft

Schematic and Routing Diagrams

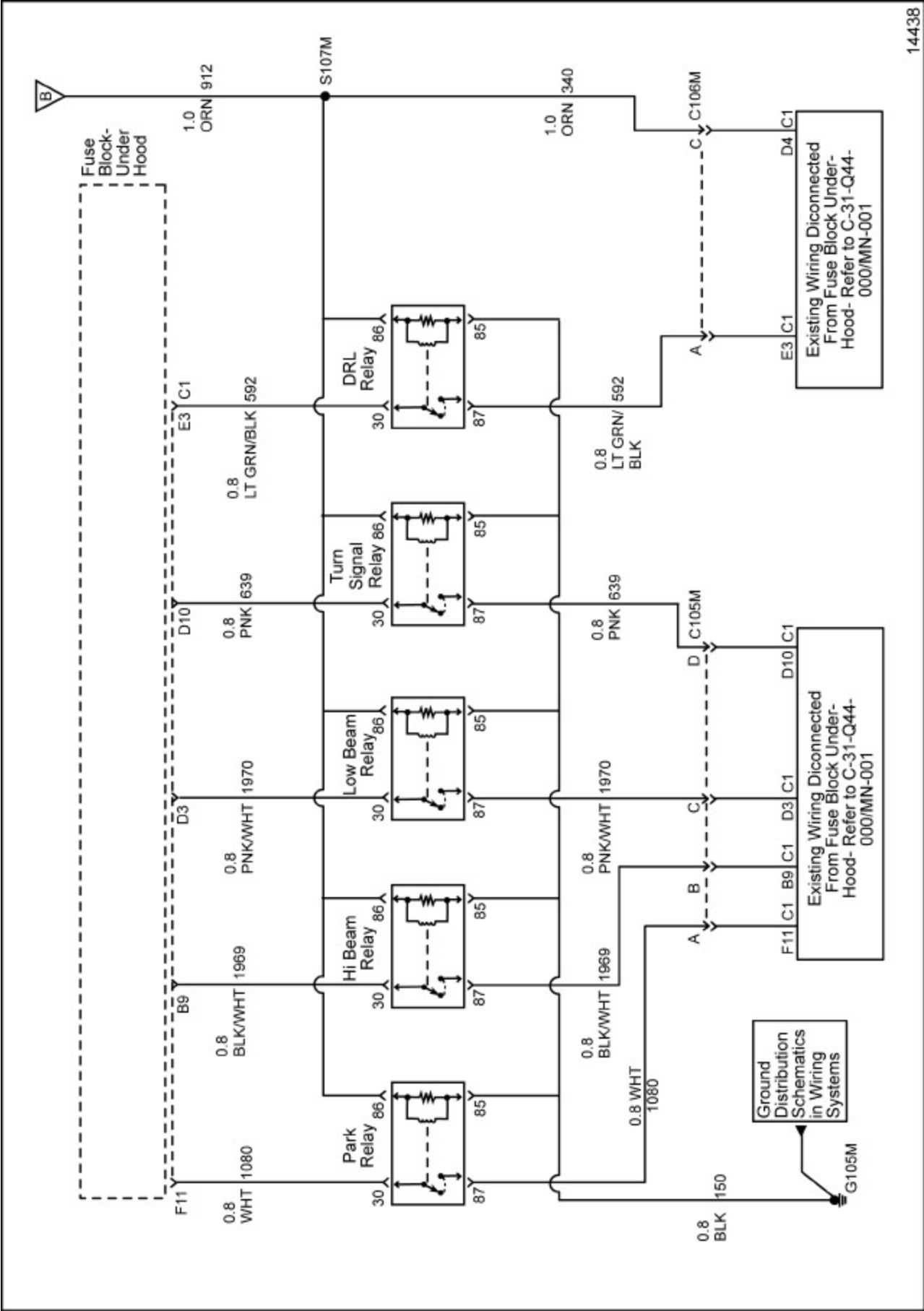
Blackout (B/O) Light Controls



Topper Lighting



Relays (Underhood Fuse Block)



Relay Block-I/P

Body Control Module (BCM)

Dimming Relay

Backup Lamp Relay

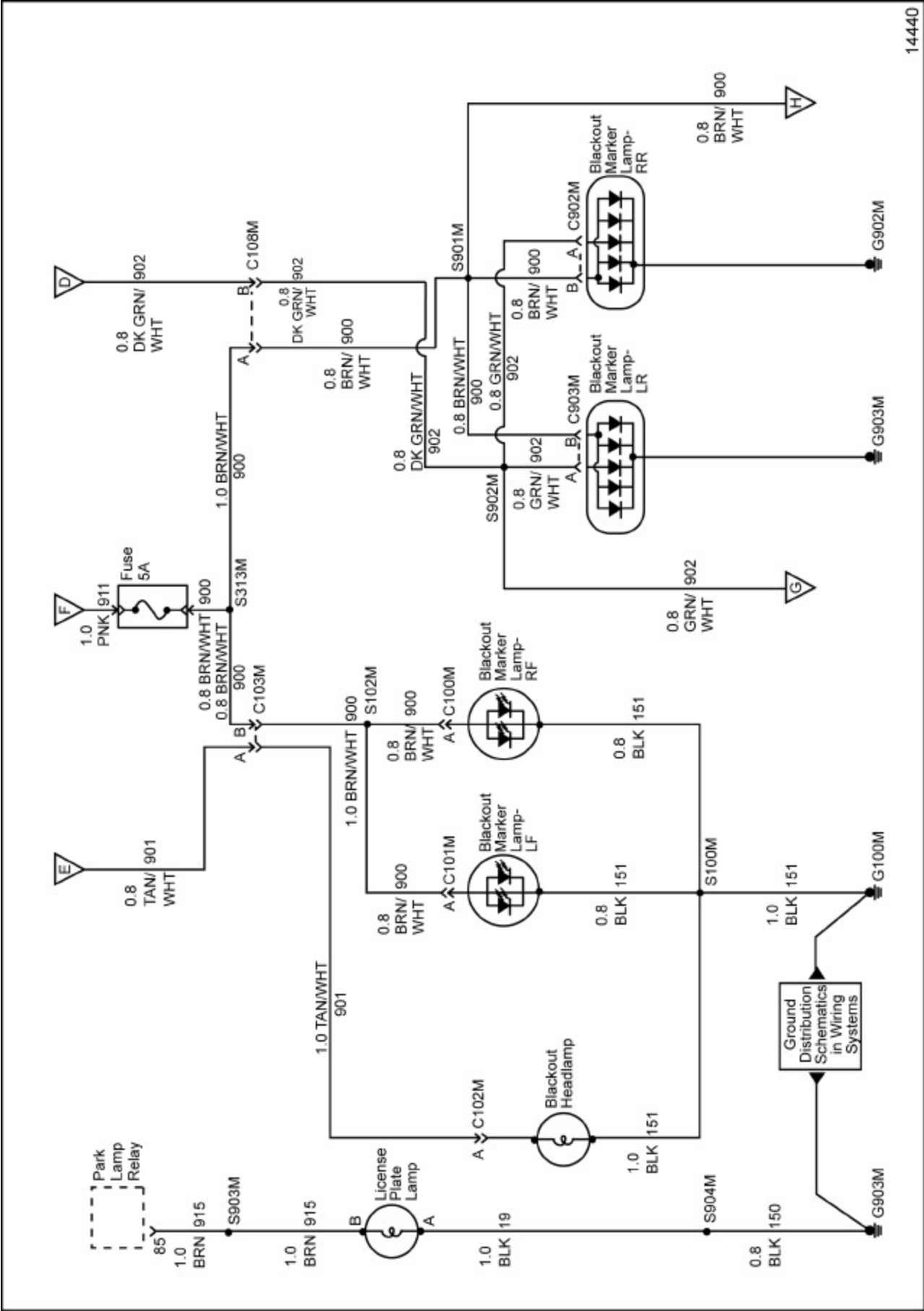
CTSY 1 Relay

CTSY 2 Relay

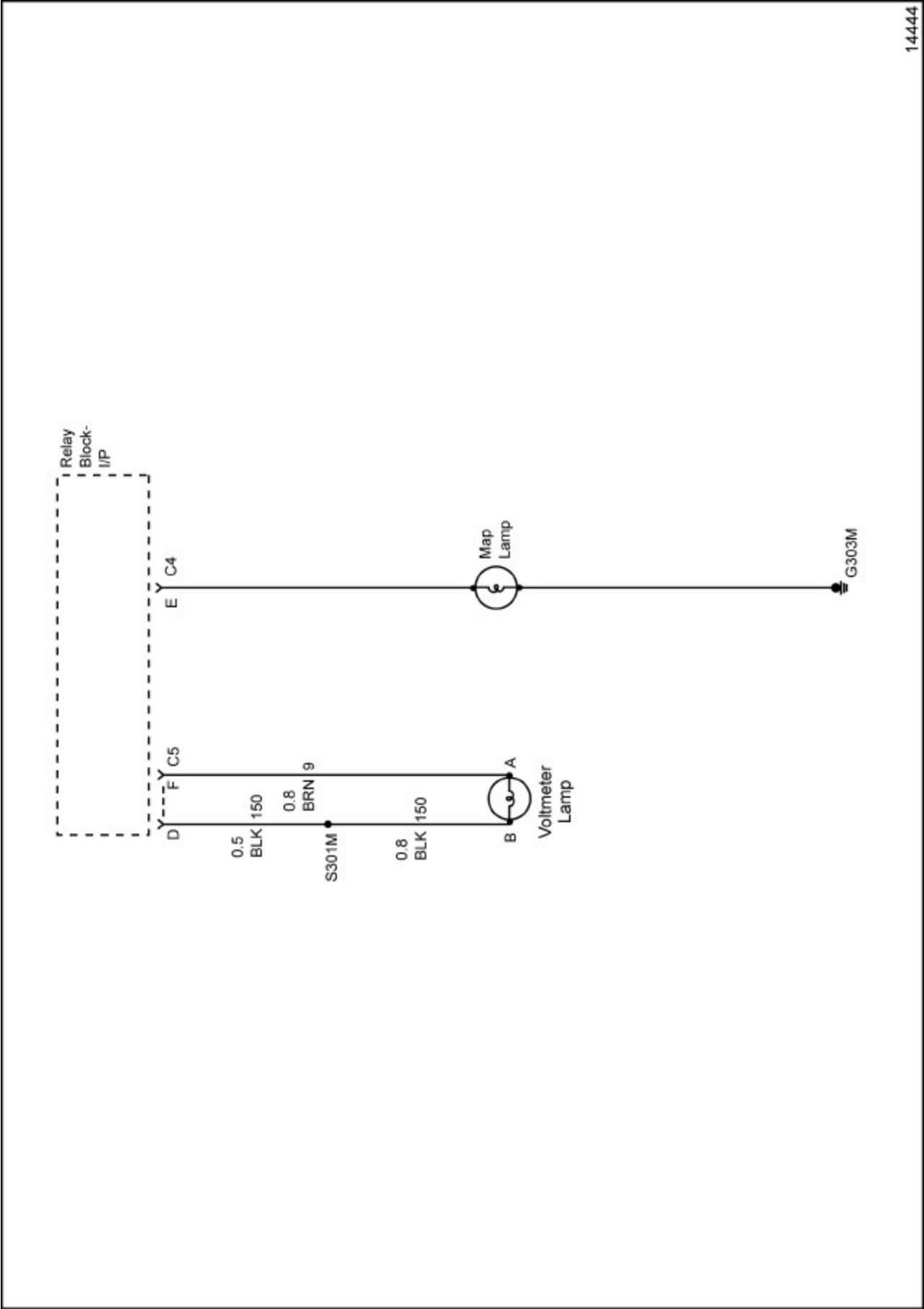
Callout 1: Relay Block-I/P Disconnected From Relay Block-I/P Refer to C-31-Q44-000/MN-001

Callout 2: B8-C3 B6-C4 B11-C2 F-C5 Disconnected From Body Control Module (BCM) Refer to C-31-Q44-000/MN-001

External Lighting



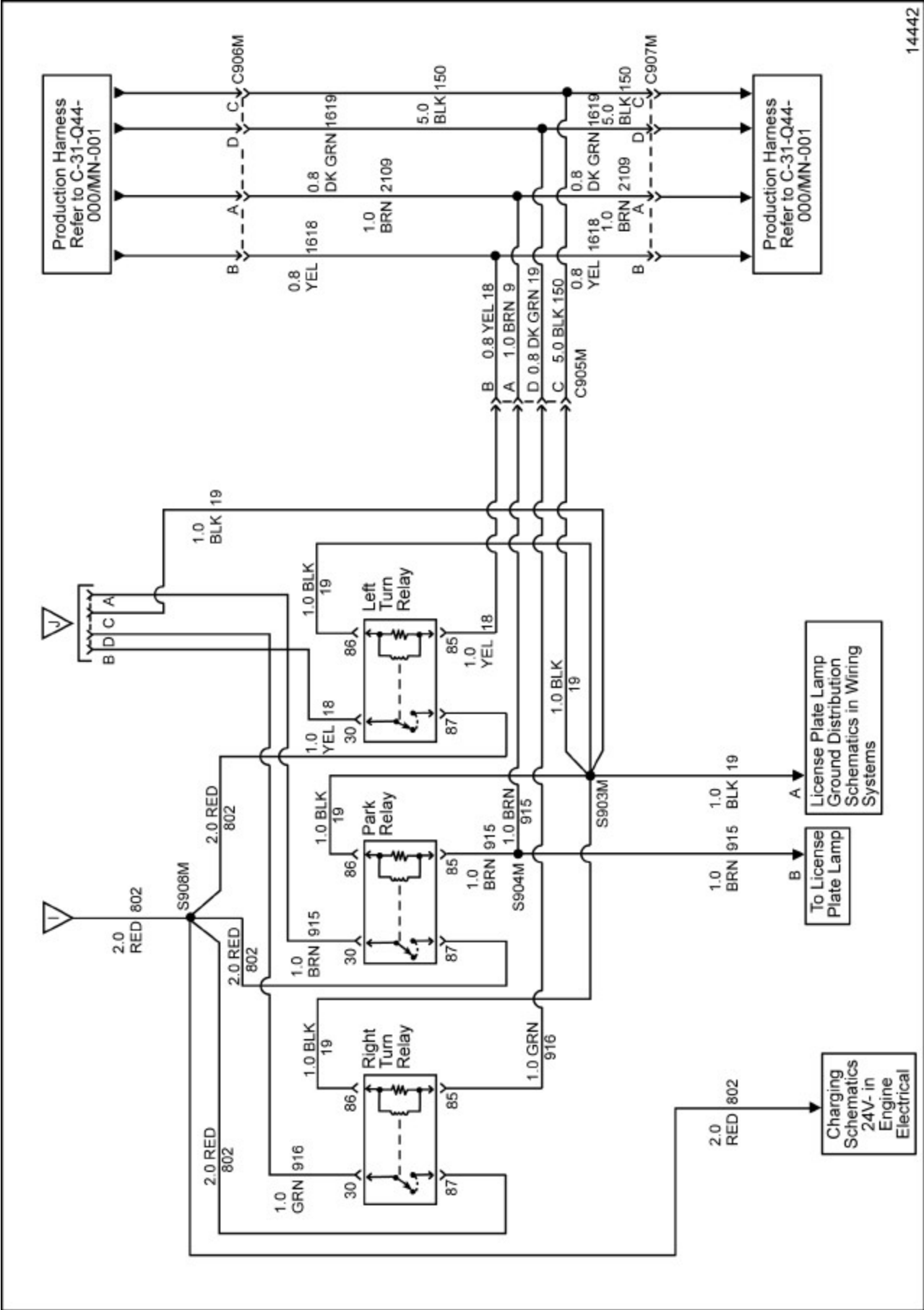
Interior Lighting



14444

[illegible]

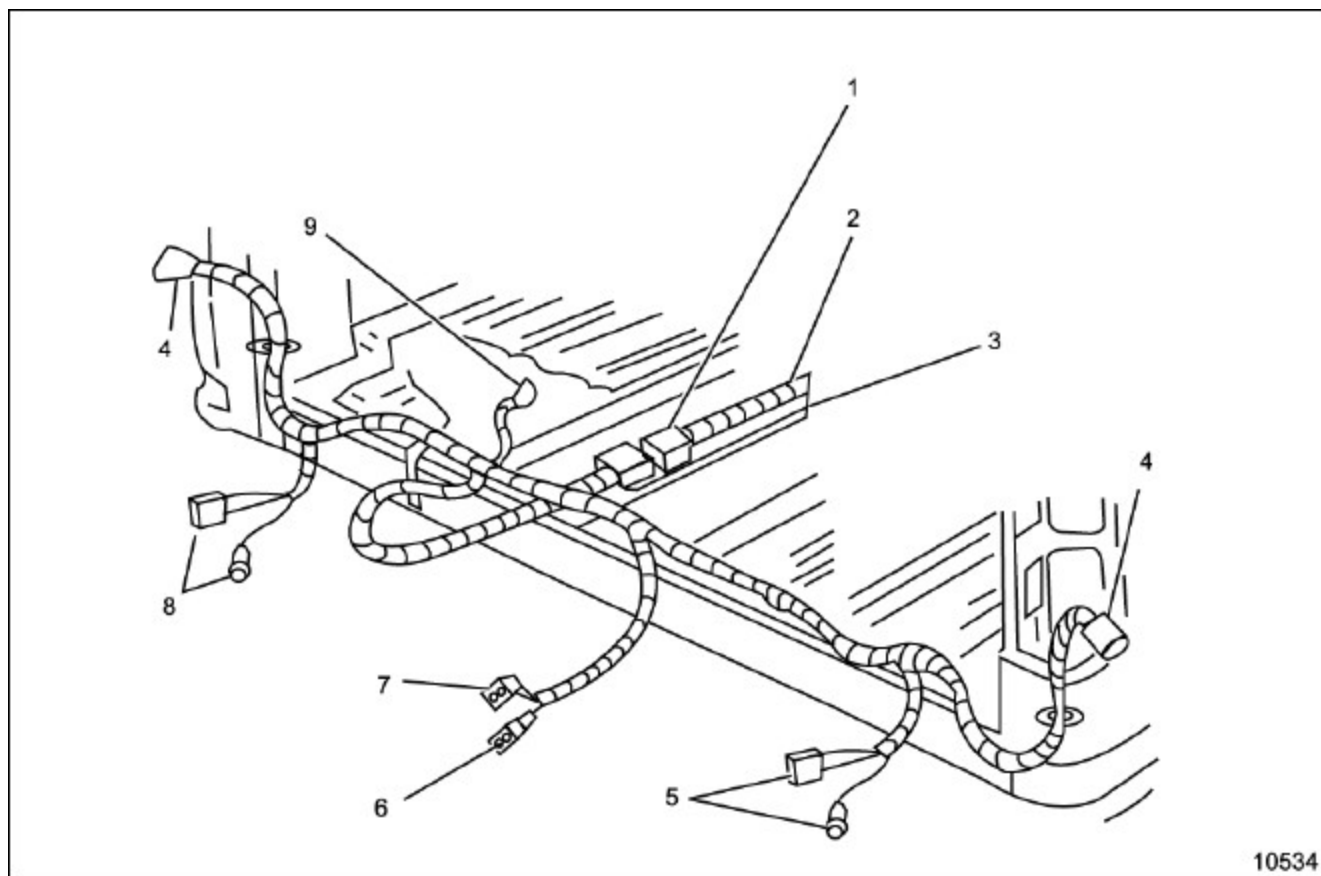
Rear Relay Harness



Component Locator

Lighting Systems Component Views

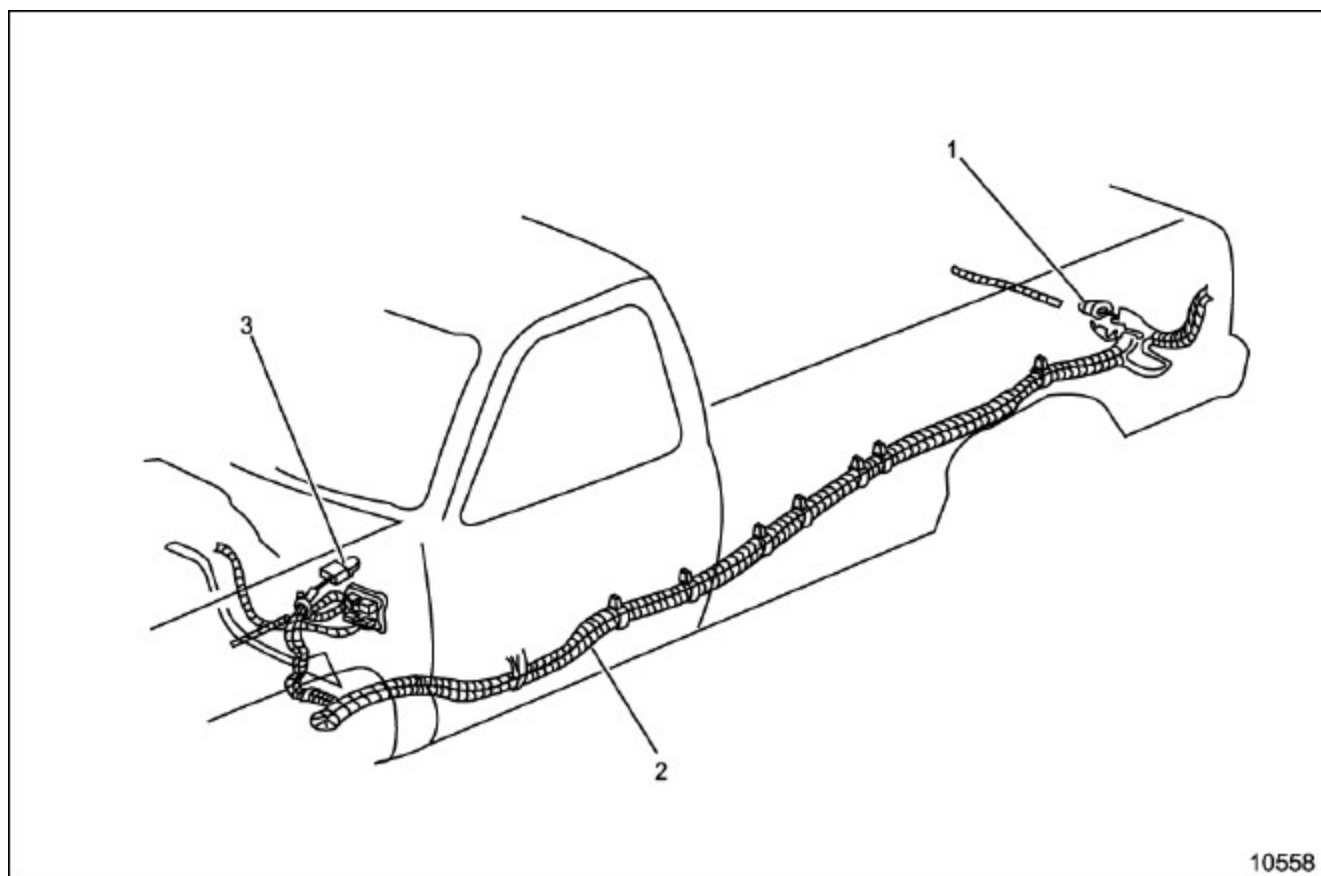
Rear Lamp Harness



Legend

- | | |
|---|---------------------------------------|
| (1) C908M | (6) Military Trailer Connector |
| (2) Auxiliary Rear Lamp Extension Harness | (7) Military Trailer Connector |
| (3) Rear of Vehicle | (8) To Blackout (B/O) Marker Lamp, LH |
| (4) Taillamp | (9) G901M |
| (5) To Blackout (B/O) Marker Lamp, RH | |

Auxiliary Rear Lamp Harness

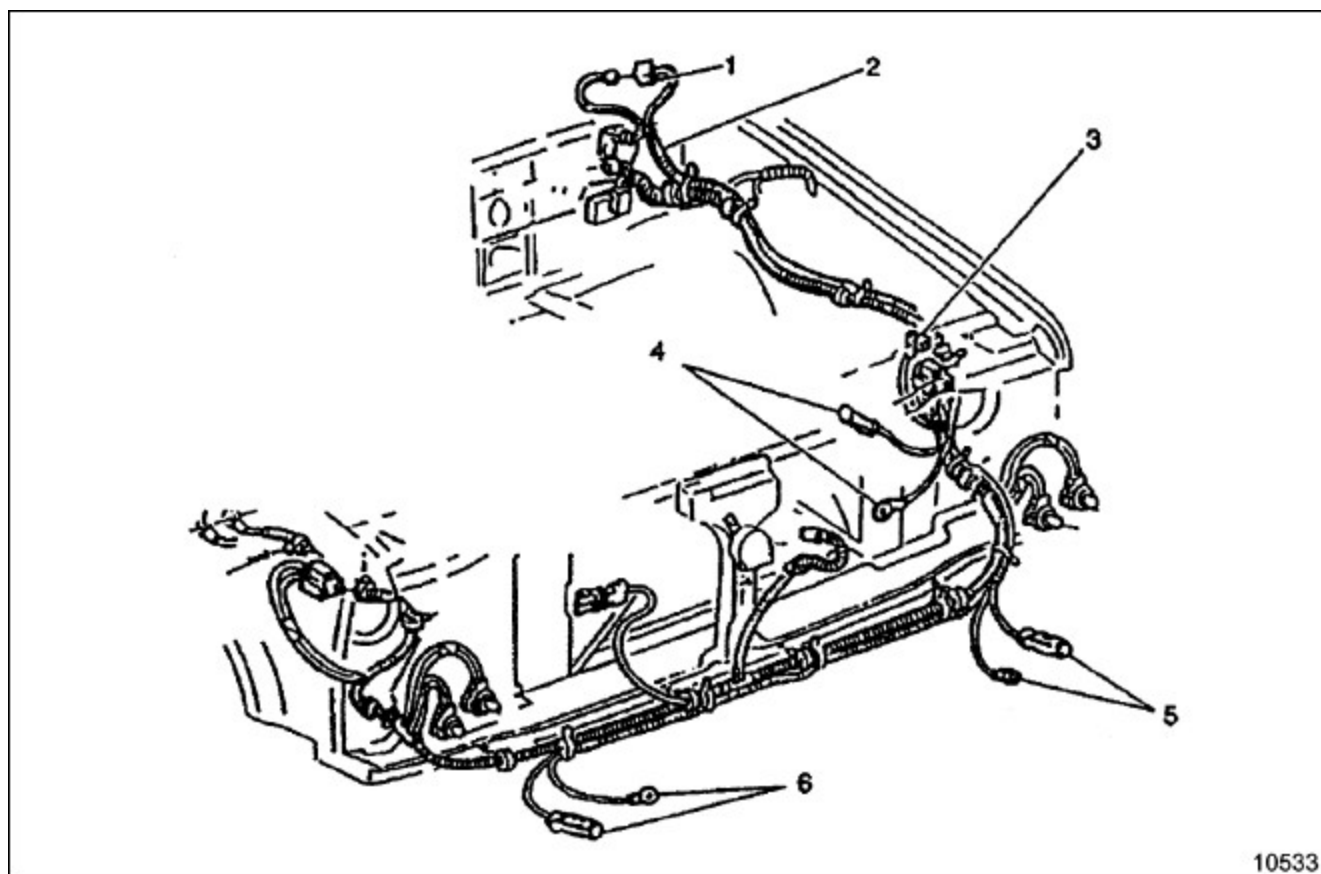
**Legend**

(1) C908M

(3) I/P Wiring Harness

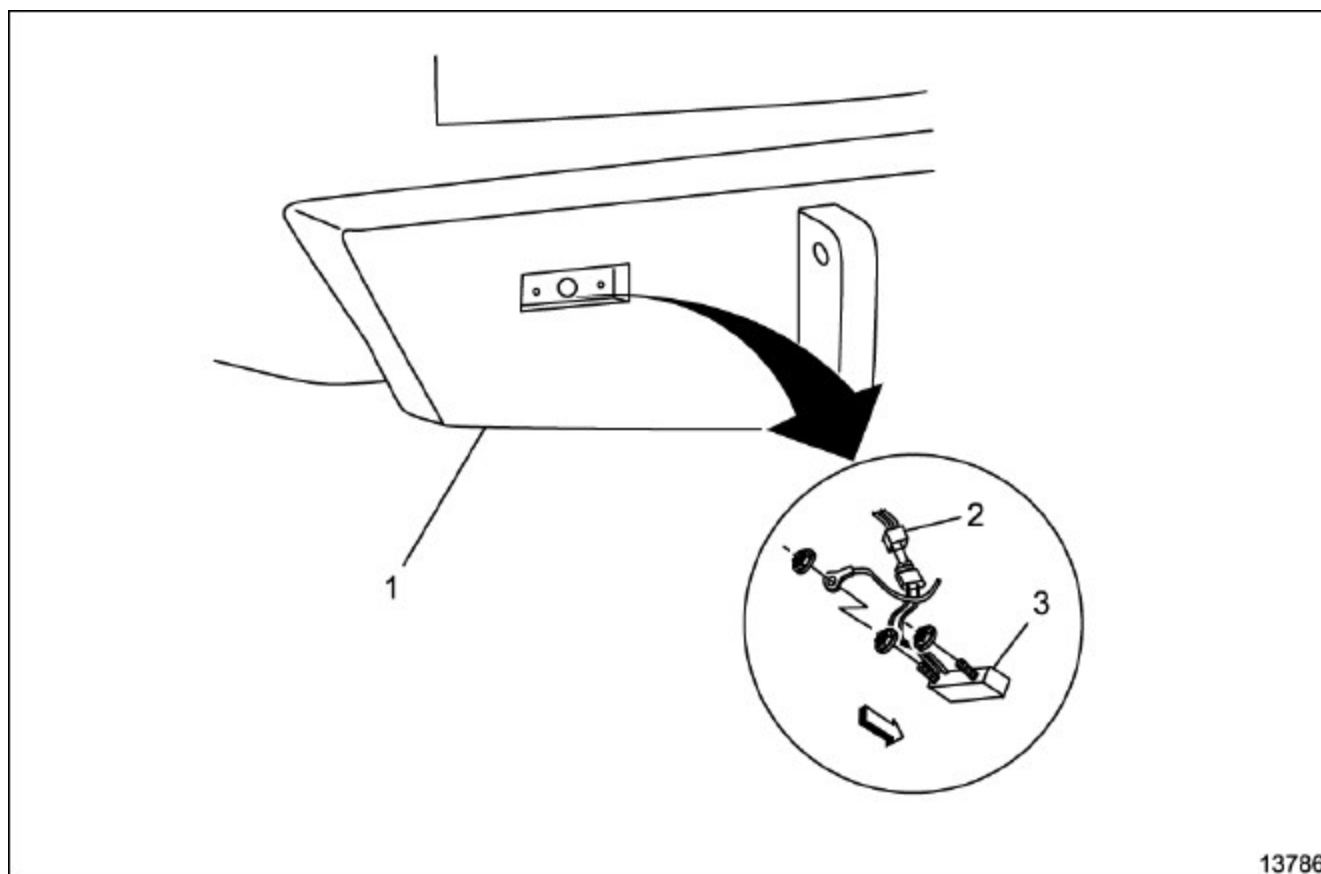
(2) Auxiliary Rear Lamp Harness

Forward Blackout (B/O) Lamp Harness

**Legend**

- | | |
|---------------------------------|---------------------------------------|
| (1) I/P Wiring Harness | (4) To Blackout (B/O) Headlamp |
| (2) Forward Lamp Harness | (5) To Blackout (B/O) Marker Lamp, LF |
| (3) Forward Lamp Harness Ground | (6) To Blackout (B/O) Marker Lamp, RF |

Rear Blackout (B/O) Lamps

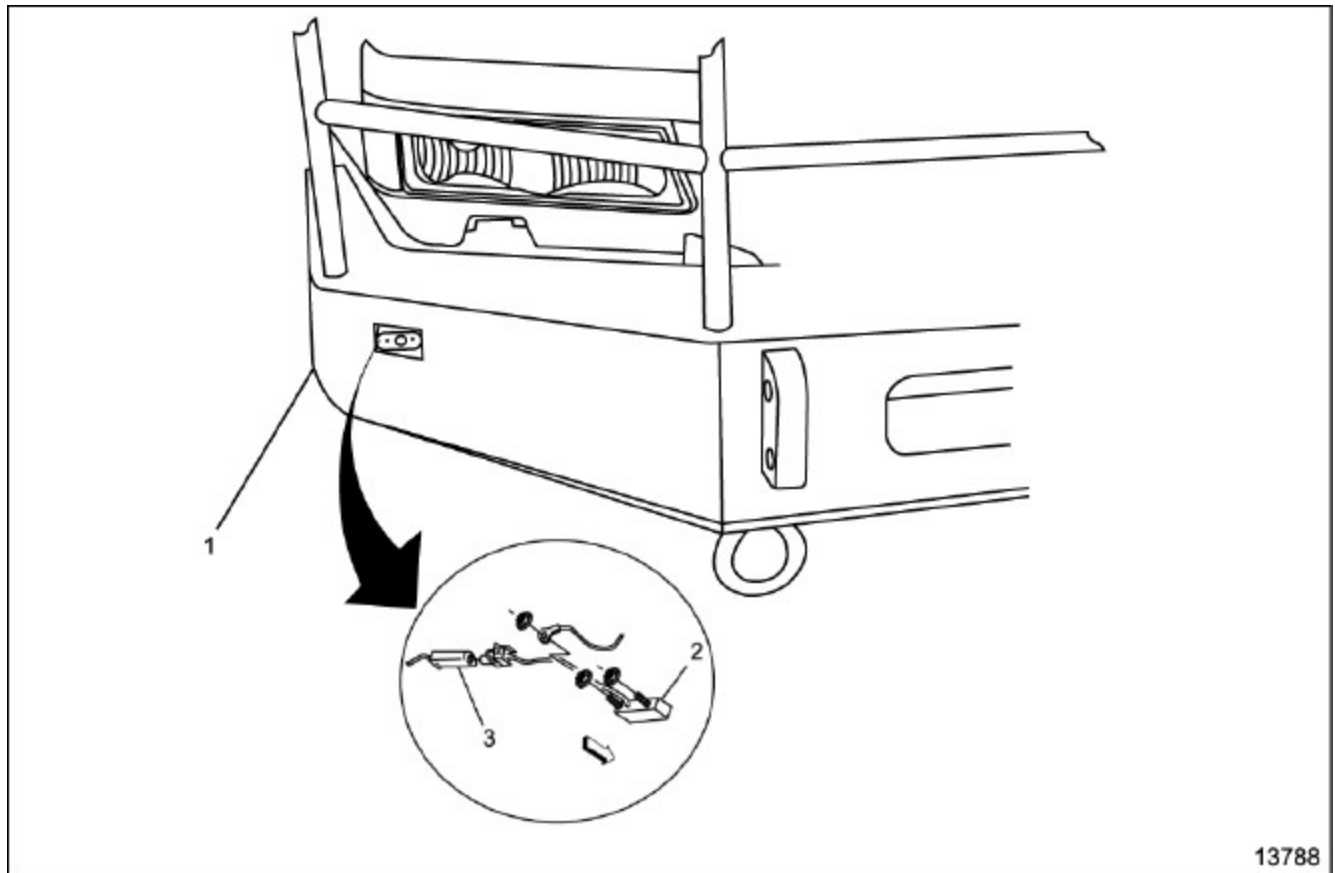
**Legend**

(1) Rear Bumper

(2) Lamp Harness Connector

(3) Blackout (B/O) Lamp Assembly

Front Blackout (B/O) Marker Lamps

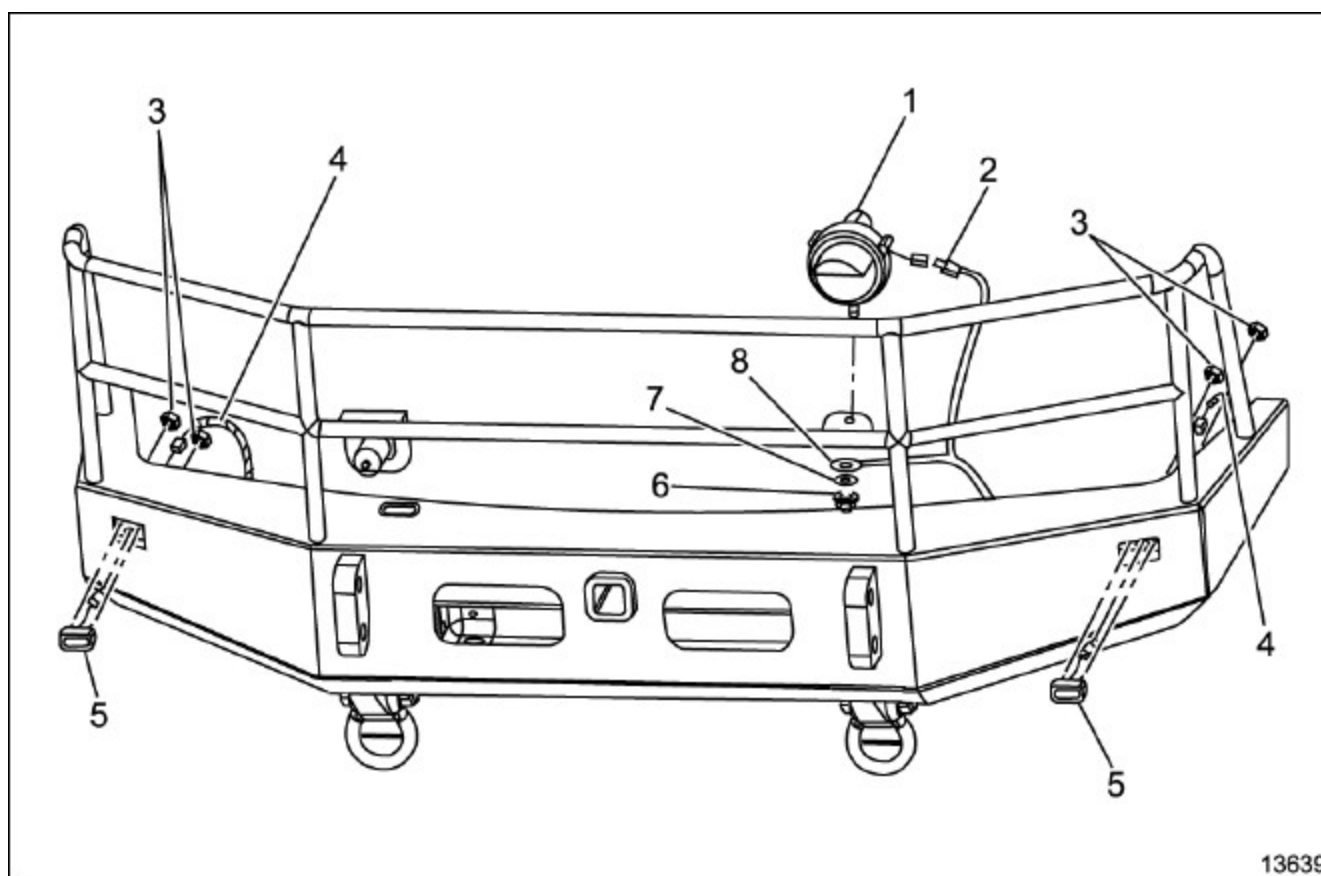
**Legend**

(1) Front Bumper

(3) Forward Lamp Harness

(2) Blackout (B/O) Lamp Assembly

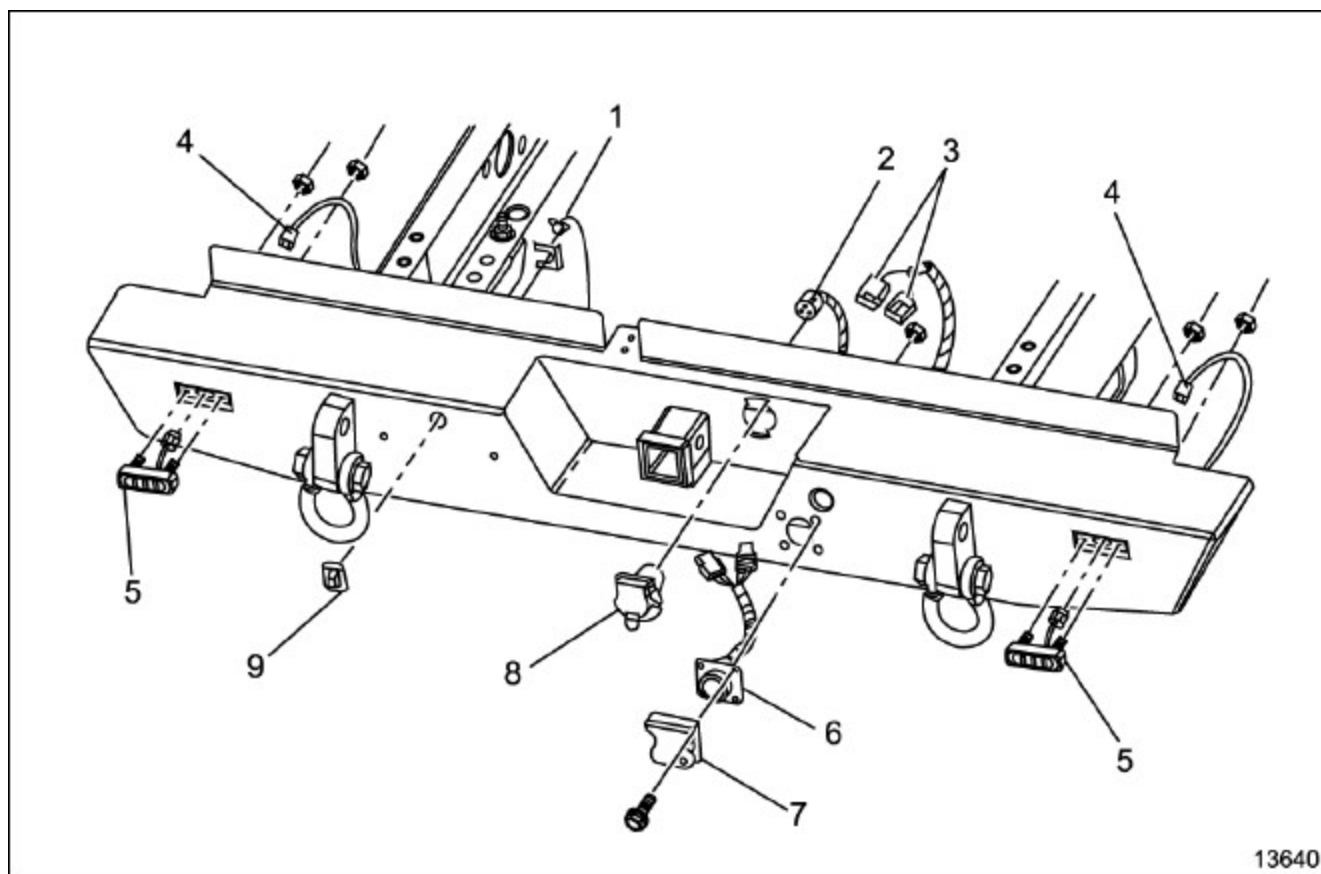
Front Lighting



Legend

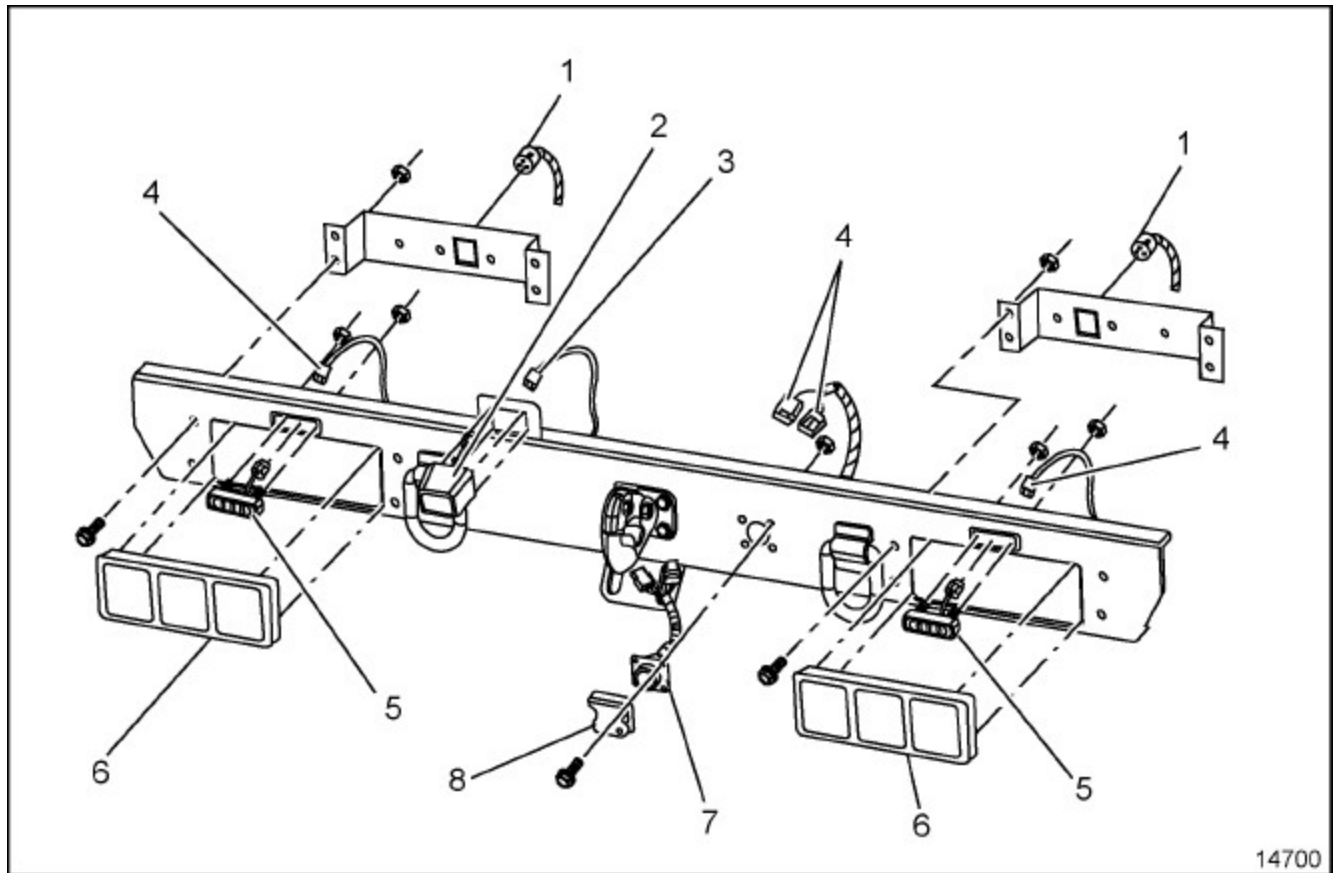
- | | |
|---|----------------------------|
| (1) Blackout (B/O) Headlamp | (5) Marker Lamps |
| (2) Headlamp Harness Connector | (6) Headlamp Fastening Nut |
| (3) Blackout (B/O) Marker Lamp Fastening Nuts | (7) Washer |
| (4) Marker Lamp Harness Connector | (8) Headlamp Ground Lead |

Rear Lighting (Basic and MP)

**Legend**

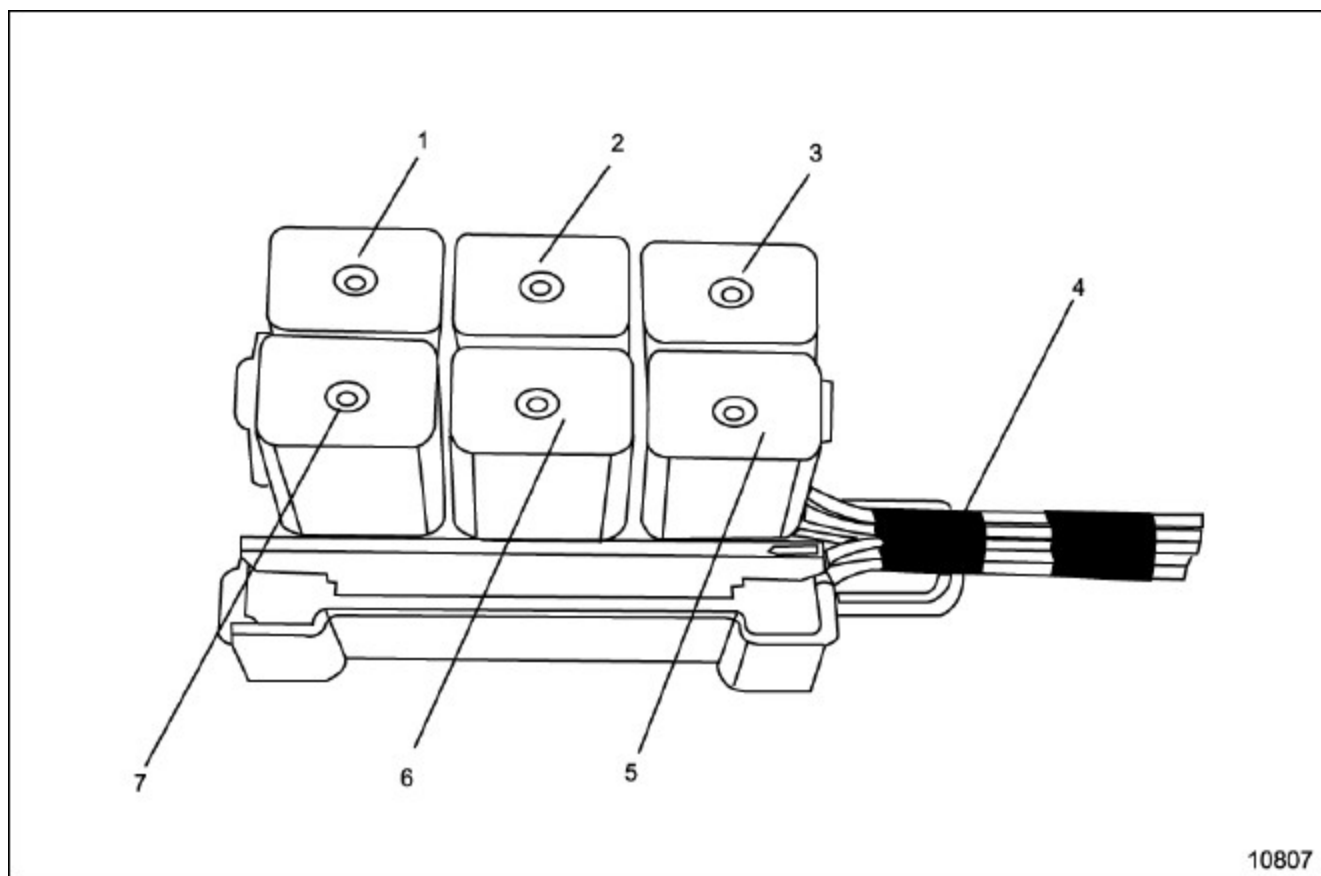
- | | |
|--|------------------------------------|
| (1) License Plate Lamp | (6) Trailer Connector (Military) |
| (2) Trailer Harness Connector (Commercial) | (7) Trailer Connector Cover |
| (3) Trailer Harness Connector (Military) | (8) Trailer Connector (Commercial) |
| (4) Marker Lamp Harness Connections | (9) License Plate Lamp |
| (5) Blackout (B/O) Marker Lamps | |

Rear Lighting Cable Layer (SEV)

**Legend**

- | | |
|-----------------------------------|--------------------------------|
| (1) Tail Lamp Connections | (5) Blackout (B/O) Marker Lamp |
| (2) License Plate Lamp Assy | (6) Tail Lamps |
| (3) License Plate Lamp Connection | (7) Trailer Connector |
| (4) Trailer Harness Connection | (8) Trailer Connector Cover |

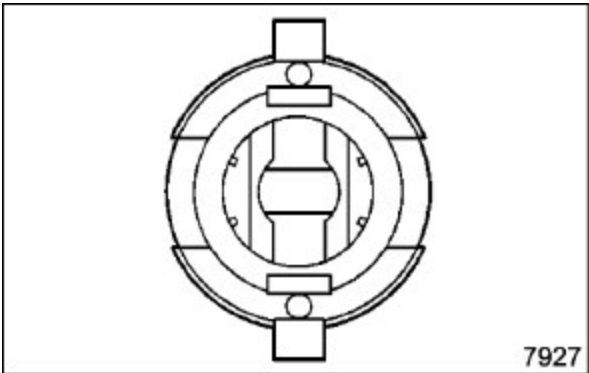
Relay Block

**Legend**

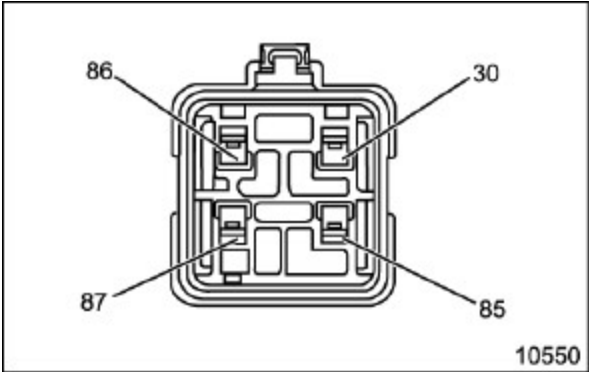
- | | |
|----------------------------|-----------------------------|
| (1) Turn Signal Relay | (5) Headlamp Low Beam Relay |
| (2) Park Lamp Relay | (6) DRL Relay |
| (3) Headlamp Hi-Beam Relay | (7) Horn Relay |
| (4) Harness TXO 17860 | |

Lighting Systems Connector End Views

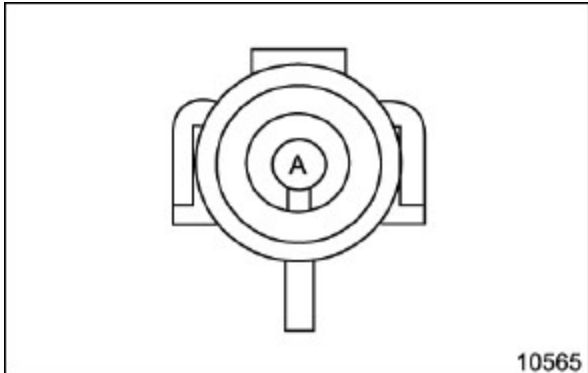
License Plate Lamp

			
Connector Part Information		<ul style="list-style-type: none"> 12010946 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BLK	19	Ground
B	BRN	915	Lamp Voltage

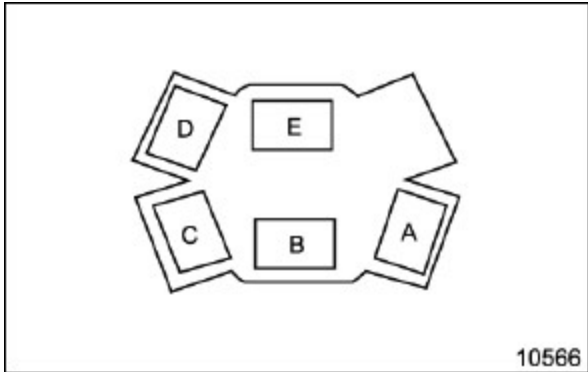
Blackout (B/O) Control Relay

			
Connector Part Information		<ul style="list-style-type: none"> 12129716 4-Way F M/P Series 280 (GRY) 	
Pin	Wire Colour	Circuit No.	Function
86	WHT	915	Blackout (B/O) Relay Feed from Blackout (B/O) Control Switch
85	TAN/WHT	901	Blackout (B/O) Drive Lamp
87	PNK	911	Power to Blackout (B/O) Controls
30	BRN/WHT	901	Blackout (B/O) Drive Lamp

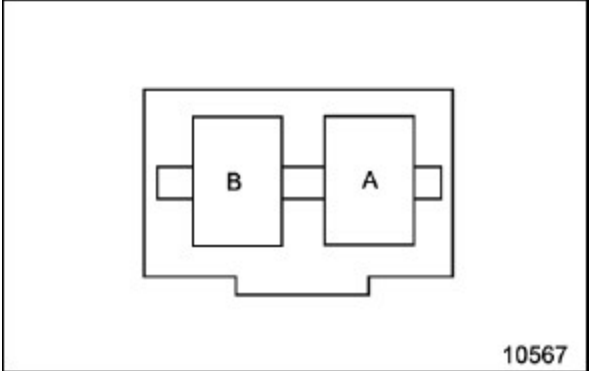
Blackout (B/O) Headlamp

			
Connector Part Information		<ul style="list-style-type: none"> 12010996 1-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	TAN/WHT	901	Blackout (B/O) Driver Lamps

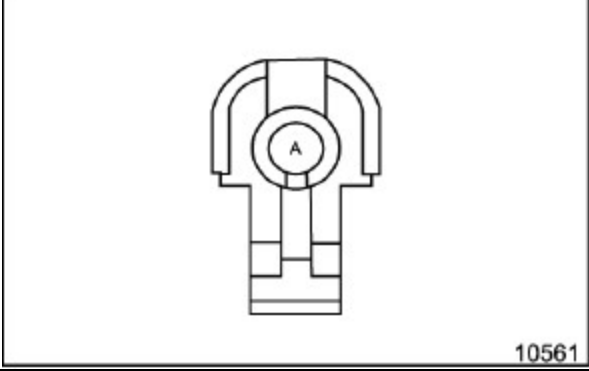
Blackout (B/O) Drive Lamp Switch

			
Connector Part Information		<ul style="list-style-type: none"> 08911352 5-Way F Series 56 (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	—	—	Not Used
B	TAN/WHT	901	Blackout (B/O) Drive Lamp
C	PNK	911	Power to Blackout (B/O) Control Switch to Blackout (B/O) Relay Feed
D	WHT	915	Blackout (B/O) Control Relay
E	BLK	150	Ground

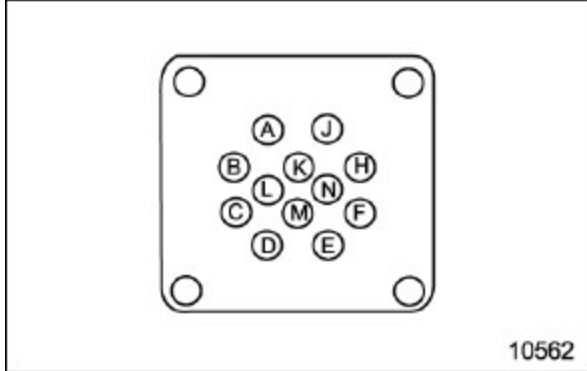
Blackout (B/O) Lamps Fuse

			
Connector Part Information		<ul style="list-style-type: none"> • 12010105 • 2-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	900	Voltage to Blackout (B/O) Marker Lamps
B	PNK	911	Voltage from Blackout (B/O) Controls

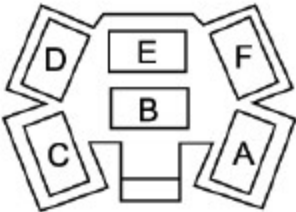
Blackout (B/O) Marker Lamp (Front)

			
Connector Part Information		<ul style="list-style-type: none"> • 12015791 • 1-Way F Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BRN/WHT	900	Blackout (B/O) Marker Lamps

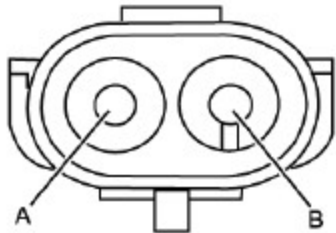
Trailer Lamp Connector

			
Connector Part Information		<ul style="list-style-type: none"> • 08917884 • 12-Way Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	BRN	900	Blackout (B/O) Marker Lamps
B	YEL	18	Brake/Tail Lamp Feed
C	BRN	900	Blackout (B/O) Control Circuits
D	BLK	913	Service Stoplamps
E	BRN	17	Stoplamp Switch Output
F	PPL	902	Blackout (B/O) Brakelamps
H	BRN	900	Blackout (B/O) Brakelamp
J	PPL	19	Brake/Tail Lamp Feed, RR
K-N	—	—	Not Used

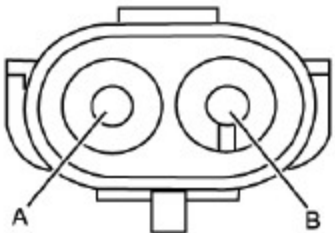
Service Lamp Switch

 <p style="text-align: right;">10563</p>			
Connector Part Information		<ul style="list-style-type: none"> • 08917695 • 6-Way F M/P Series 280 (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	PNK	911	Power to Blackout (B/O) Control
B	ORN	40	Junction Block-Body
C	ORN	912	Blackout (B/O) Control Circuits
D	WHT	913	Service Stoplamps
E	WHT	17	Stoplamp Switch Output
F	DK GRN/ WHT	902	Blackout (B/O) Stoplamps

Blackout (B/O) Lamps (Left Rear)

 <p style="text-align: right;">10574</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12010973 • 2-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	GRN/ WHT	902	Blackout (B/O) Stop Lamp
B	BRN/ WHT	900	Blackout (B/O) Marker Lamp

Blackout (B/O) Lamps (Right Rear)

 <p style="text-align: right;">10574</p>			
Connector Part Information		<ul style="list-style-type: none"> • 12010973 • 2-Way M Weather Pack (BLK) 	
Pin	Wire Colour	Circuit No.	Function
A	GRN/ WHT	902	Blackout (B/O) Stop Lamp
B	BRN/ WHT	900	Blackout (B/O) Marker Lamp

Diagnostic Information and Procedures

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Blackout (B/O) Headlamp Inoperative
- Blackout (B/O) Headlamp Always On
- Headlamps Operate in Blackout (B/O) Mode
- Backup Lamps Inoperative
- Blackout (B/O) Stoplamps Inoperative
- Blackout (B/O) Marker Lamps Inoperative
- Blackout (B/O) Marker Lamps Always On
- DRL Operate in Blackout (B/O) Mode
- Backup Lamps Operate in Blackout (B/O) Mode
- Park Lamps Operate in Blackout (B/O) Mode
- CTSY Lamps Operate in Blackout (B/O) Mode
- Turn Signals Operate in Blackout (B/O) Mode
- Hi Beam Headlamps Operate in Blackout (B/O) Mode
- Low Beam Headlamps Operate in Blackout (B/O) Mode

Blackout (B/O) Headlamp Inoperative

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	Inspect condition of fuses. If fuse is open, locate and repair source of overload and replace fuse. Did you find and correct the condition?	Go to Step 20	Go to Step 3
3	1. Place blackout (B/O) service switch in blackout (B/O) mode. 2. Turn blackout (B/O) headlamp switch to ON position. 3. Connect a test lamp to circuit 901 (TAN/WHT) at connector C192 cavity A of the blackout (B/O) headlamp and ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 7
4	1. Disconnect the blackout (B/O) lamp. 2. Connect a self-powered test lamp at circuit 151(BLK) and ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 5
5	Locate and repair open circuit 151 (BLK) between blackout (B/O) headlamp and G113. Did you complete the repair?	Go to Step 20	—
6	Replace blackout (B/O) headlamp bulb. Did you complete the replacement?	Go to Step 20	—
7	1. Place blackout (B/O) switch to ON position. 2. Connect a test lamp at circuit 901 (TAN/WHT) wire between blackout (B/O) control relay cavity 85 connector C216 and ground. Does the test lamp illuminate?	Go to Step 8	Go to Step 9

Blackout (B/O) Headlamp Inoperative (cont'd)

Step	Action	Yes	No
8	Locate and repair open in circuit 901 (TAN/WHT) wire between blackout (B/O) lamp cavity A and blackout (B/O) control relay cavity 85 connector C216. Did you complete the repair?	Go to Step 20	—
9	Connect a test lamp at circuit 911 (PNK) wire between blackout (B/O) control relay cavity 87 and ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 11
10	Connect test lamp at circuit 915 (WHT) wire cavity 86 and cavity 87 of the blackout (B/O) control relay. Does the test lamp illuminate?	Go to Step 13	Go to Step 15
11	Connect a test lamp from blackout (B/O) service switch cavity A circuit 911 (PNK) and ground. Does the test lamp illuminate?	Go to Step 12	Go to Step 14
12	Locate and repair open in circuit 911 (PNK) between blackout (B/O) service lamp switch and blackout (B/O) control relay. Did you complete the repair?	Go to Step 20	—
13	Replace blackout (B/O) control relay. Did you complete the replacement?	Go to Step 20	—
14	Connect a test lamp from the blackout (B/O) service switch at cavity B circuit 40 (ORN) and ground. Does the test lamp illuminate?	Go to Step 19	Go to Step 18
15	1. Disconnect blackout (B/O) headlamp switch. 2. Connect a self-powered test lamp between blackout (B/O) headlamp switch cavity E circuit 150 (BLK) and ground. Does the test lamp illuminate?	Go to Step 16	Go to Step 17
16	Replace blackout (B/O) headlamp switch. Did you complete the replacement?	Go to Step 20	—
17	Locate and repair open in circuit 150 (BLK) wire between blackout (B/O) headlamp switch and ground. Did you complete the repair?	Go to Step 20	—
18	Locate and repair open in circuit 40 (ORN) wire between connector C241 and blackout (B/O) service lamp switch cavity B. Did you complete the repair?	Go to Step 20	—
19	Replace blackout (B/O) service switch. Did you complete the replacement?	Go to Step 20	—
20	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Blackout (B/O) Headlamp Always On

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go Description and Operation
2	Place blackout (B/O) drive lamp switch in OFF mode. Connect a test lamp between blackout (B/O) drive lamp switch cavity B circuit 901 (PNK) to ground. Does the test lamp illuminate?	Go to Step 3	Go to Step 4
3	Replace blackout (B/O) drive lamp switch. Did you complete the replacement?	Go to Step 5	—
4	Repair short to power in circuit 901 or inoperable blackout (B/O) control relay. Did you find and correct the condition?	Go to Step 5	—
5	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Headlamps Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place blackout (B/O) service switch into the blackout (B/O) mode. 2. Connect a test lamp from cavity 85 at the blackout (B/O) lighting control relay and ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 3
3	Replace blackout (B/O) control relay. Did you complete the replacement?	Go to Step 5	—
4	Replace blackout (B/O) service switch. Did you complete the replacement?	Go to Step 5	—
5	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Backup Lamps Inoperative

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	Is only one backup lamp inoperative?	Go to Step 3	Go to Step 4

Backup Lamps Inoperative (cont'd)

Step	Action	Yes	No
3	Test the backup lamp supply voltage circuit of the inoperative bulb for high resistance, an open, or a short to ground. Did you find and correct the condition?	Go to Step 17	Go to Step 5
4	1. Inspect the condition of the backup lamp fuses. 2. Is the fuse open, locate and repair the source of the overload and replace fuse. Did you find and correct the condition?	Go to Step 17	Go to Step 6
5	Test the ground circuit of the inoperative bulb for high resistance or an open. Did you find and correct the condition?	Go to Step 17	Go to Step 13
6	Connect a test lamp between connector C1 cavity C of the junction block – rear lamps and ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 9
7	Connect a test lamp between connector C1 cavity E and ground. Does the test lamp illuminate?	Go to Step 8	Go to Step 13
8	Locate and repair the open or high resistance in the ground circuit. Did you complete the repair?	Go to Step 17	—
9	Connect a test lamp between cavity 30 of the interrupt relay and ground. Does the test lamp illuminate?	Go to Step 10	Go to Step 11
10	Locate and repair the open in circuit 24. Did you complete the repair?	Go to Step 17	—
11	Connect a test lamp between cavity 87 of the interrupt relay and ground. Does the test lamp illuminate?	Go to Step 14	Go to Step 12
12	Connect a test lamp between cavity F of the backup lamp switch and ground. Does the test lamp illuminate?	Go to Step 15	Go to Step 16
13	Replace the bulbs. Did you complete the repair?	Go to Step 17	—
14	Replace the interrupt relay. Did you complete the repair?	Go to Step 17	—
15	Locate and repair the open or high resistance in circuit 1524 or 24. Did you complete the repair?	Go to Step 17	—
16	Replace the backup lamp switch. Did you complete the replacement?	Go to Step 17	—
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Stoplamps Inoperative

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	Observe the stop lamps while pressing the brake pedal. Does the system operate normally?	Go to Testing for Electrical Intermittents in Wiring Systems of C-31-Q44-000/MN-001	Go to Step 3
3	Inspect the fuse(s), check for damaged or corroded inline connectors, check for broken or partially broken wires inside insulation and properly installed aftermarket equipment. Did you find the condition?	Go to Step 4	Go to Step 5
4	Make necessary repairs. Did you complete the repairs?	Go to Step 15	—
5	Are all the stop lamps inoperative?	Go to Step 6	Go to Step 8
6	1. Disconnect blackout (B/O) service lamp switch. 2. Connect test lamp between circuit 913 (WHT) cavity D wire and ground. Does the test light illuminate?	Go to Step 10	Go to Step 7
7	Locate and repair the open or high resistance in circuit 913. Did you correct the condition?	Go to Step 15	—
8	Test the supply voltage circuit of the inoperative lamp for high resistance, an open, or a short to ground. Refer to Circuit Testing, and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 15	Go to Step 9
9	Test the ground circuit of the inoperative lamp for high resistance, an open. Refer to Circuit Testing, and Wiring Repairs in Wiring Systems. Did you find and correct the condition?	Go to Step 15	Go to Step 14
10	Using a fused jumper, connect cavity D to cavity F of the blackout (B/O) service lamp switch connector. Do the brake lamps illuminate?	Go to Step 11	Go to Step 12
11	Replace blackout (B/O) service lamp switch. Did you complete the replacement?	Go to Step 15	—
12	Connect a test lamp between terminal A of the rear B/O stop lamps and ground. Did the test lamp illuminate?	Go to Step 14	Go to Step 13
13	Locate and repair the open or high resistance in circuit 902. Did you correct the condition?	Go to Step 15	—
14	Replace the blackout (B/O) stop lamp(s). Did you complete the replacement?	Go to Step 15	—

Stoplamps Inoperative (cont'd)

Step	Action	Yes	No
15	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Blackout (B/O) Marker Lamps Inoperative

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	Verify that the marker lamps are inoperative. Do the marker lamps operate normally?	Go to Testing for Electrical Intermittents in Wiring Systems of C-31-Q44-000/MN-001	Go to Step 3
3	Are all marker lamps inoperative?	Go to Step 4	Go to Step 8
4	Inspect the fuse(s), check for corroded inline connectors, check for broken or partially broken wires inside insulation and for properly installed aftermarket equipment. Did you find the condition?	Go to Step 5	Go to Step 6
5	Make necessary repairs. Did you complete the repairs?	Go to Step 14	—
6	1. Place blackout (B/O) service switch in blackout (B/O) mode. 2. Connect a test lamp at cavity A circuit 911 (PNK) wire at blackout (B/O) service drive switch and ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 14
7	Connect a test lamp between inline fuse cavity B circuit 911 (PNK) wire and ground. Does the test lamp illuminate?	Go to Step 11	Go to Step 10
8	Test the supply circuit of the inoperative lamp for high resistance, an open. Refer to Circuit Testing, and Wiring Repairs in Wiring Systems in C-31-Q44-000/MN-001. Did you find and correct the condition?	Go to Step 18	Go to Step 9
9	Test the ground circuit of the inoperative lamp for high resistance, an open. Refer to Circuit Testing, and Wiring Repairs in Wiring Systems in C-31-Q44-000/MN-001. Did you find and correct the condition?	Go to Step 18	Go to Step 12
10	Locate and repair open in circuit 911 (PNK) wire between inline fuse B and blackout (B/O) service drive switch. Did you complete the repair?	Go to Step 18	—

Blackout (B/O) Marker Lamps Inoperative (cont'd)

Step	Action	Yes	No
11	Disconnect blackout (B/O) marker lamp(s) and connect test lamp between cavity A circuit 900 (BRN/WHT) front and circuit 900 (BRN/WHT) rear to ground. Does the test lamp illuminate?	Go to Step 12	Go to Step 13
12	Replace blackout (B/O) marker lamp(s) assembly. Did you complete the replacement?	Go to Step 18	—
13	Locate and repair open in circuit 900 (BRN/WHT) front and circuit 900 (BRN/WHT) rear wire between inline fuse and blackout (B/O) marker lamp assembly. Did you complete the repair?	Go to Step 18	—
14	Connect a test lamp between blackout (B/O) service switch to circuit 40 (ORN) cavity B and ground. Does the test lamp illuminate?	Go to Step 15	Go to Step 16
15	Replace blackout (B/O) service switch. Did you complete the replacement?	Go to Step 18	—
16	Connect a test lamp at I/P relay block connector C8 cavity C circuit 40 (ORN) wire and ground. Does the test lamp illuminate?	Go to Step 17	Refer to C31-Q44-000/MN-001
17	Locate and repair open in circuit 40 (ORN) wire between I/P relay block connector C8 cavity C and blackout (B/O) service drive switch. Did you complete the repair?	Go to Step 18	—
18	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Blackout (B/O) Marker Lamps Always On

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	Verify that the marker lamps are always on. Do the marker lamps operate normally?	Go to Testing for Electrical Intermittents in Wiring Systems of C-31-Q44-000/MN-001	Go to Step 3
3	1. Disconnect blackout (B/O) service switch. 2. Connect a test lamp between circuit 911 (PNK) cavity A wire and ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 5

Blackout (B/O) Marker Lamps Always On (cont'd)

Step	Action	Yes	No
4	Repair short to power in circuit 911 (PNK) or circuit 900 (BRN/WHT) wire(s) between blackout (B/O) service switch and blackout (B/O) marker lamps. Did you complete the repair?	Go to Step 6	—
5	Replace blackout (B/O) service switch. Did you complete the replacement?	Go to Step 6	—
6	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

DRL Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove DRL interrupt relay from the relay module. Are the DRL's illuminated?	Go to Step 8	Go to Step 7
7	Replace the DRL relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 592 (LT.GRN/BLK). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Backup Lamps Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test lamp illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove the backup lamp interrupt relay from the relay module. Are the backup lamps illuminated?	Go to Step 8	Go to Step 7
7	Replace the backup interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 24 (GRN/BLK). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Park Lamps Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6

Park Lamps Operate in Blackout (B/O) Mode (cont'd)

Step	Action	Yes	No
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test light illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove the park lamp interrupt relay from the relay module. Are the park lamps illuminated?	Go to Step 8	Go to Step 7
7	Replace the park lamp interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 1080 (WHT). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

CTSY Lamps Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service lamp switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test light illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—

CTSY Lamps Operate in Blackout (B/O) Mode (cont'd)

Step	Action	Yes	No
6	Remove the CTSY 1 interrupt relay from the relay module. Are the CTSY lamps illuminated?	Go to Step 8	Go to Step 7
7	Replace the CTSY 1 interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 690 (GRY/BLK). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Turn Signals Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test light illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove the turn signal interrupt relay. Do the turn signals operate?	Go to Step 8	Go to Step 7
7	Replace the turn signal interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 639 (PNK). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Hi Beam Headlamps Operate in Blackout (B/O) Mode

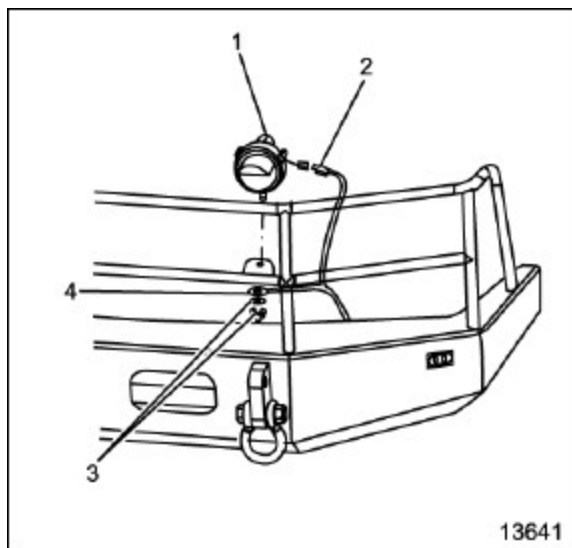
Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test light illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove the backup lamp interrupt relay from the relay module. Are the backup lamps illuminated?	Go to Step 8	Go to Step 7
7	Replace the backup interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 1969 (BLK/WHT). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

Low Beam Headlamps Operate in Blackout (B/O) Mode

Step	Action	Yes	No
Schematic Reference: Lighting Systems Schematics			
1	Did you review Blackout (B/O) Lighting Description and Operation?	Go to Step 2	Go to Description and Operation
2	1. Place the blackout (B/O) service switch in the blackout (B/O) mode. 2. Connect a test lamp at cavity C of the blackout (B/O) switch and ground. Does the test light illuminate?	Go to Step 3	Go to Step 6

Low Beam Headlamps Operate in Blackout (B/O) Mode (cont'd)

Step	Action	Yes	No
3	1. Disconnect the blackout (B/O) service switch connector from the switch. 2. Connect a test lamp at cavity C of the connector and ground. Does the test light illuminate?	Go to Step 5	Go to Step 4
4	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 9	—
5	Locate and repair the short to voltage on circuit 912 (ORN). Did you complete the repair?	Go to Step 9	—
6	Remove the backup lamp interrupt relay from the relay module. Are the backup lamps illuminated?	Go to Step 8	Go to Step 7
7	Replace the backup interrupt relay. Did you complete the replacement?	Go to Step 9	—
8	Locate and repair the short to voltage on circuit 1970 (PNK/WHT). Did you complete the repair?	Go to Step 9	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to Step 2

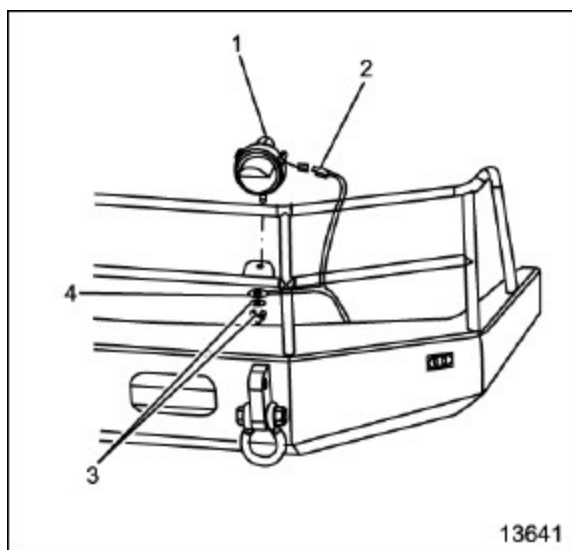


Repair Instructions

Headlamp Replacement – Blackout (B/O)

Removal Procedure

1. Remove the nut and washer (3), from the lamp stud at the base of the mounting bracket.
2. Remove the ground lead (4) by sliding it off the stud.
3. Remove the auxiliary wiring harness connector (2) by releasing the connector tab.
4. Remove the blackout (B/O) lamp assembly (1) from the mounting bracket.



Installation Procedure

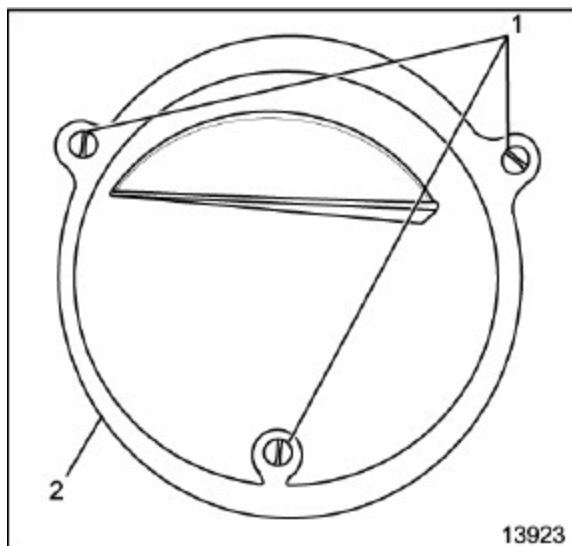
1. Install the blackout (B/O) lamp assembly (1) to the mounting bracket.
2. Install the auxiliary wiring harness connector (2).
3. Install the ground lead (4) by sliding on the stud.

Notice: Refer to Fastener Notice in Cautions and Notices.

4. Install the washer and nut (3) to the lamp stud.

Tighten

Tighten the nut to 10 N•m (7 lb ft).



Headlamp Bulb Replacement – Blackout (B/O)

Removal Procedure

1. Remove the screws (1) holding the lens cap to the assembly.
2. Remove the lens cap (2) and O-ring.
3. Remove the bulb.

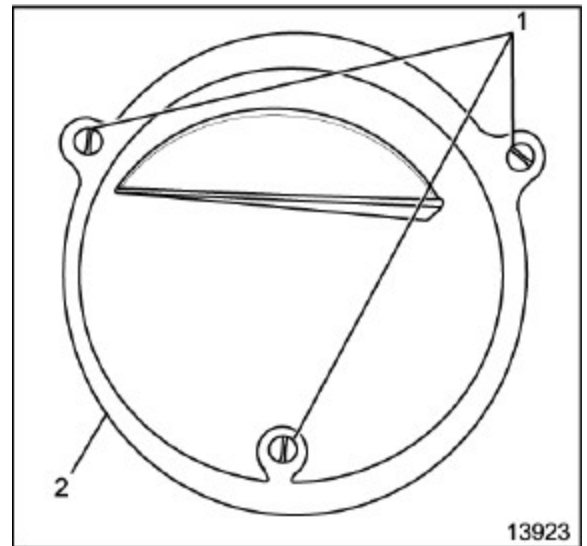
Installation Procedure

Important: Use a standard 1073 bulb for replacement.

1. Install the new bulb in the assembly.

Notice: The O-ring installation must be a proper fit.

2. Install the O-ring with the lens cover (2).
3. Install the 3 screws (1) to the assembly.

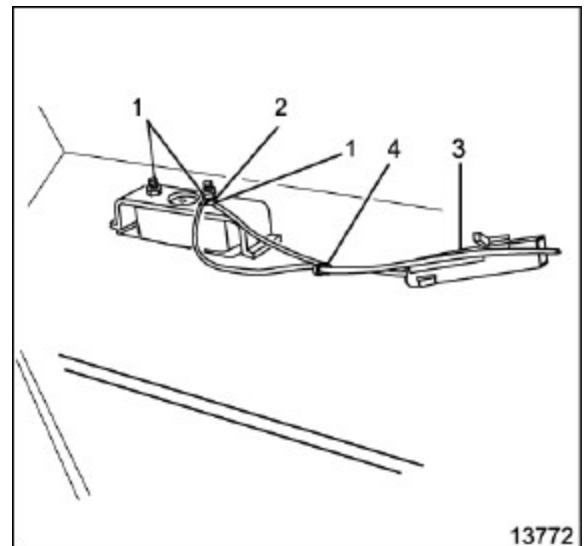


Marker Lamp Replacement – Front Blackout (B/O)

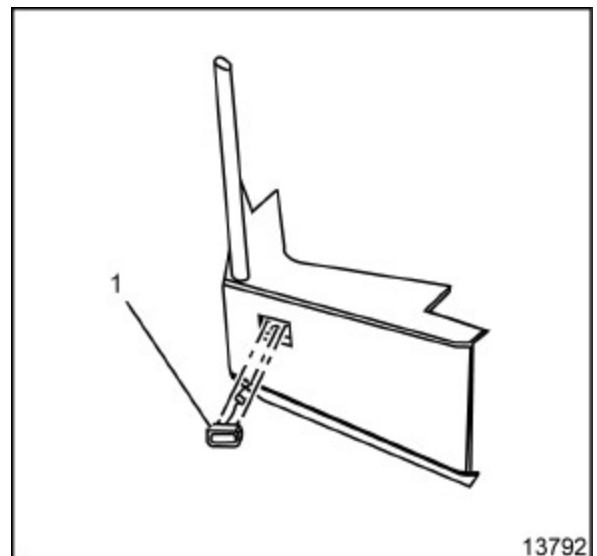
Removal Procedure

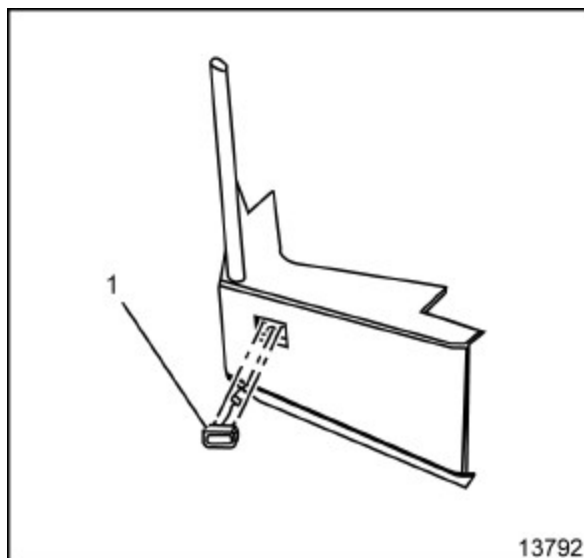
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove tie-wrap (4) from the marker lamp harness.
3. Remove the harness connector (3) by releasing the connector tab.
4. Remove the nuts (1) and the ground connector (2) from the marker lamp.



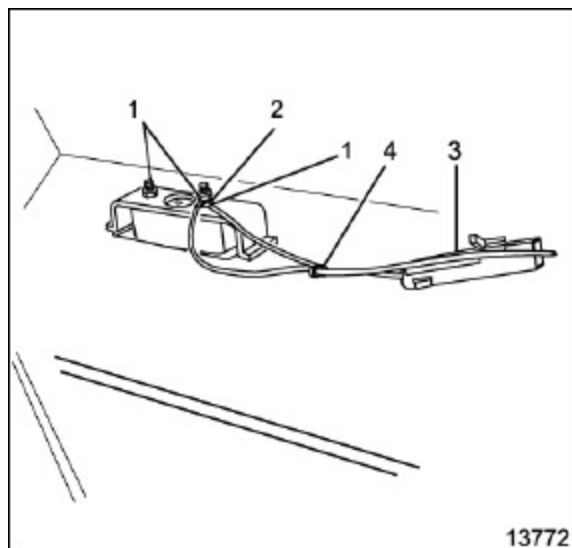
5. Remove the blackout (B/O) marker lamp assembly (1) from the bumper.





Installation Procedure

1. Install the marker lamp (1) into the front bumper opening.



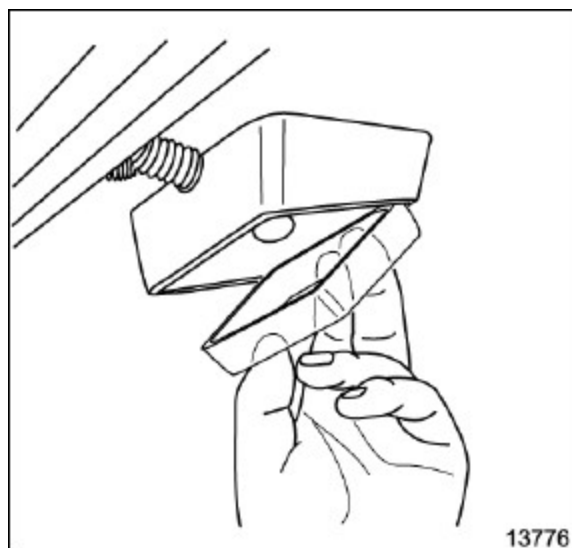
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the nuts (1) and the ground connector (2) onto the marker lamp studs.

Tighten

Tighten marker lamp nuts to 2 N•m (18 lb in).

3. Install the harness connector (2) to the marker lamp connector.
4. Secure the harness in the original mounting location using tie-wraps.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.



Dome Lamp Bulb Replacement

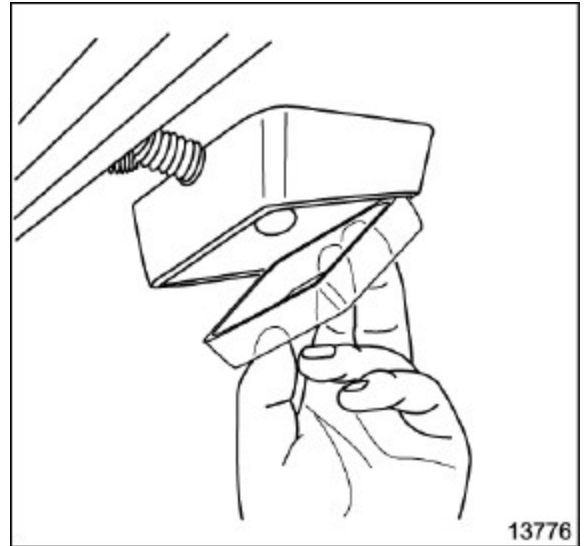
Removal Procedure

1. Press in on the sides of the lens to release the lens tabs.
2. Remove the bulb from the lamp socket.

Installation Procedure

Important: Use 912 bulb for replacement.

1. Install the bulb into the lamp socket.
2. Install the lens into the lamp push until fully seated.

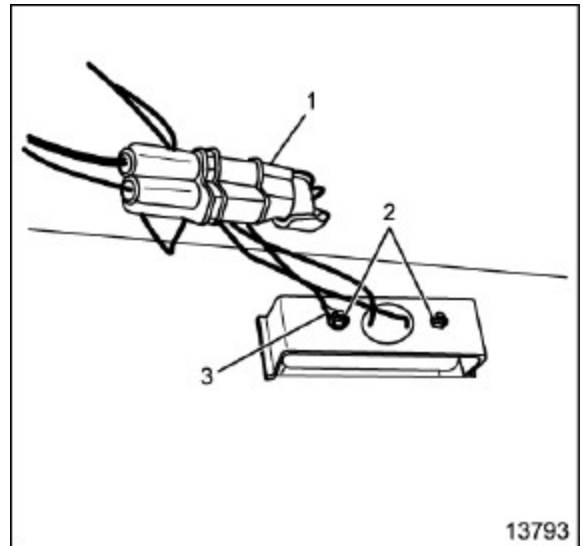


Marker Lamp Replacement – Rear

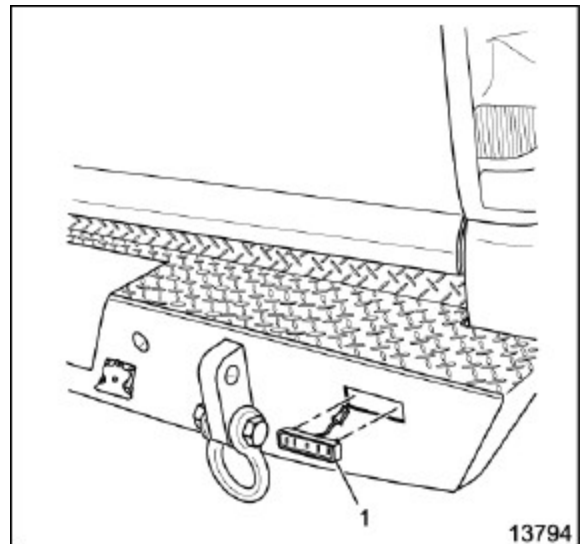
Removal Procedure

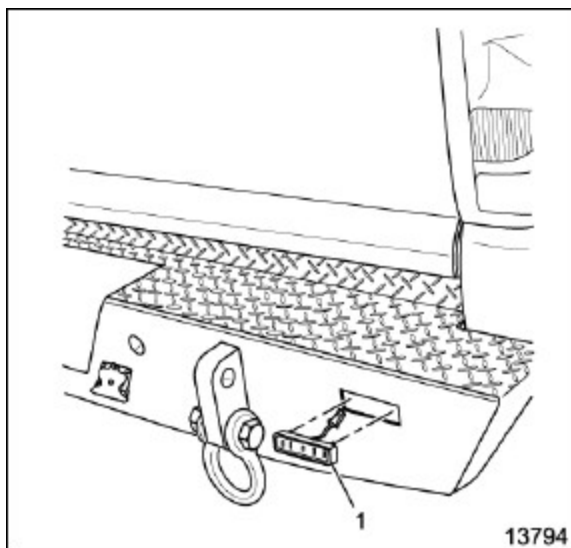
Caution: Refer to *Battery Disconnect Caution in Caution and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the tie-wrap from the marker lamp harness.
3. Disconnect the marker lamp harness connector (1) by releasing the locking tab.
4. Remove the nuts (2) and the ground connector (3) from the rear of the bumper.



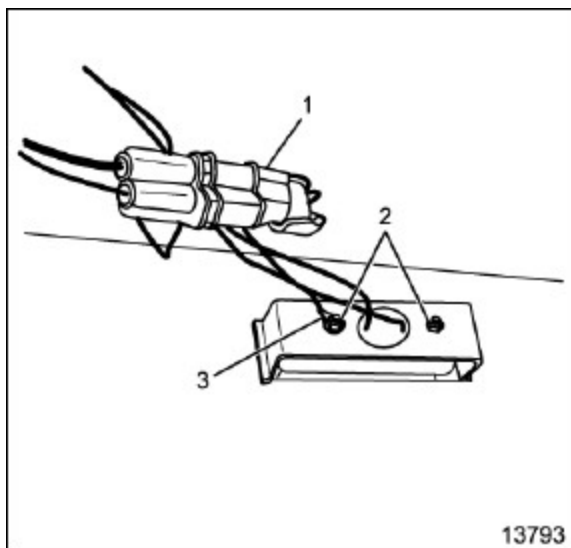
5. Remove the marker lamp (1) from the bumper.





Installation Procedure

1. Position the marker lamp (1) onto the bumper.



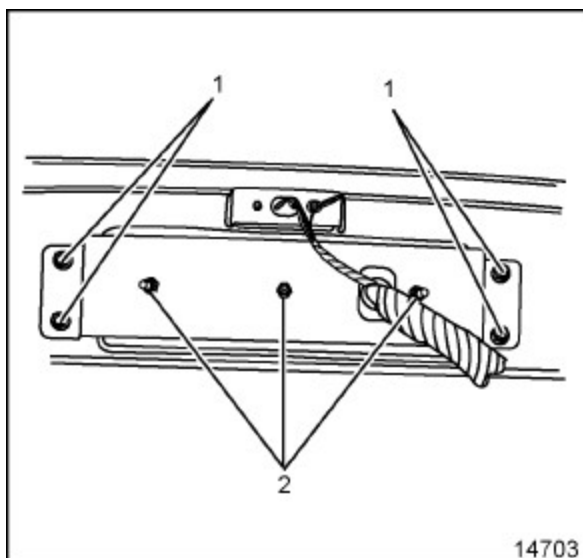
Notice: Refer to Fastener Notice in Caution and Notices.

2. Install the nuts (2) and the ground connector (3) onto the mounting studs.

Tighten

Tighten the nuts to 2 N•m (1.5 lb ft).

3. Connect the harness connector (1) to the marker lamp connector.
4. Install the harness into the original mounting location using the tie-wraps.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.



Tail Lamp Replacement (Cable Layer)

Removal Procedure

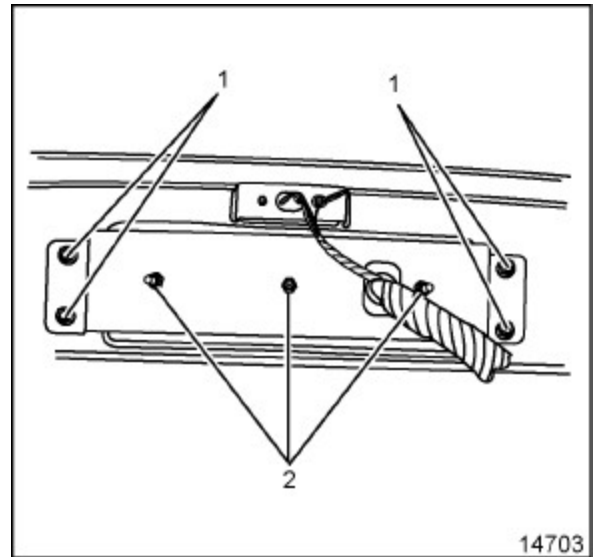
1. Ensure that the headlamp switch is in the OFF position.
2. Remove the nuts (1) from the rear bumper.
3. Remove the bracket (3) from the rear bumper.
4. Remove the nuts (2) from the bracket.
5. Disconnect the lamp from the wiring harness.

Installation Procedure

1. Install the wiring harness to the lamp.

Notice: Refer to Fastener Notice in Caution and Notices.

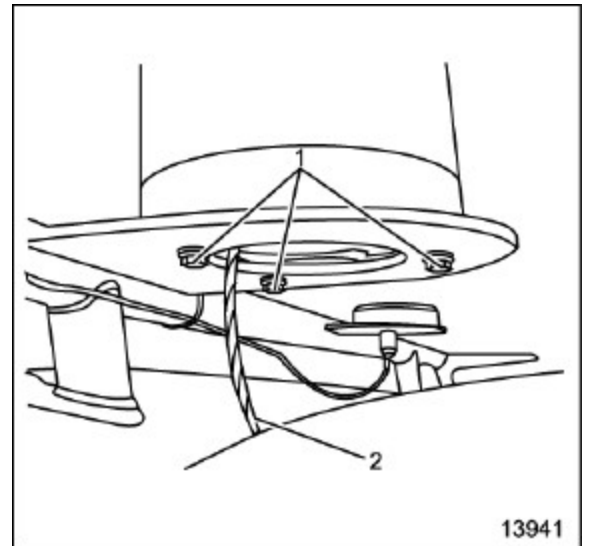
2. Install the lamp onto the bracket (3) and install nuts (2).
Tighten
Tighten the nuts to 28 N•m (21 lb ft).
3. Install the bracket (3) onto the bumper and install nuts (1).
Tighten
Tighten nuts to 27 N•m (20 lb ft).



Beacon Replacement

Removal Procedure

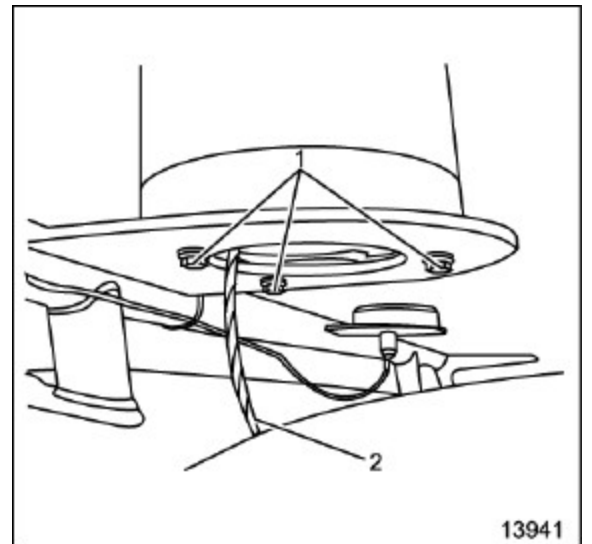
1. Remove the 6 bolts securing the lens guard to the brackets.
2. Remove the guard.
3. Push in the button and rotate the beacon lens.
4. Remove lens from beacon.
5. Disconnect the wiring harness (2) from the beacon.
6. Remove the bolts (1) and remove the beacon.

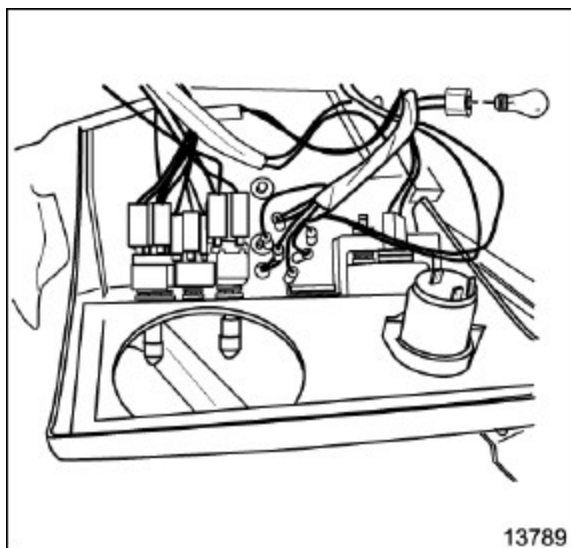


Installation Procedure

Notice: Refer to Fastener Notice in Caution and Notices.

1. Install the beacon to the light bar and install bolts (1).
Tighten
Tighten beacon bolts to 7-11 N•m (5-8 lb ft).
2. Install the wiring harness (2).
3. Install the lens to the beacon.
4. Install the guard.
5. Install the six bolts securing the lens guard to the bracket.
Tighten
Tighten guard bolts to 7-11 N•m (5-8 lb ft).



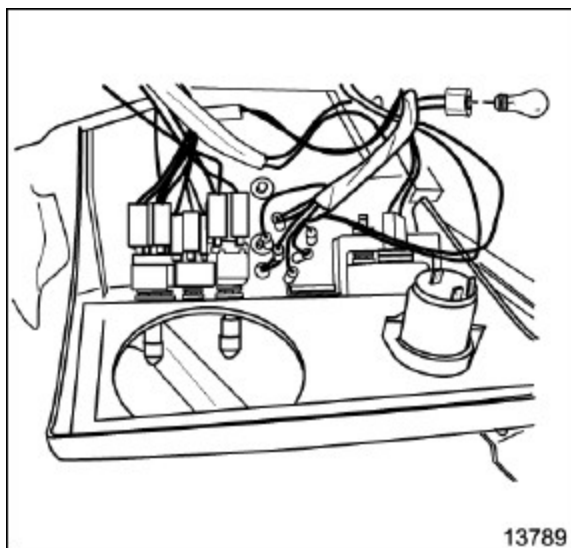


IP Compartment Lamp Replacement - Voltmeter

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Caution and Notices*.

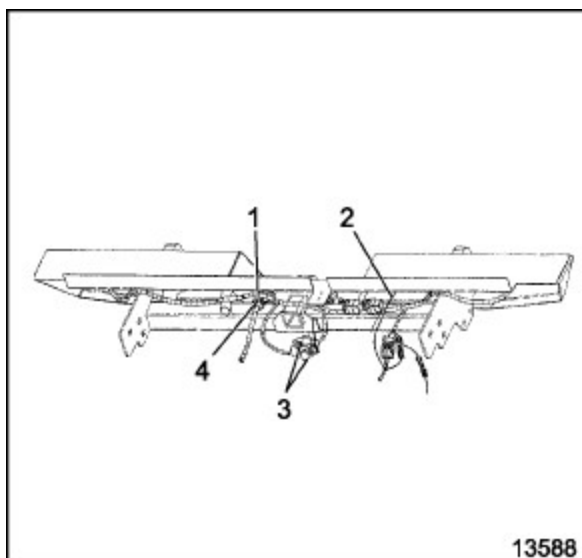
1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the voltmeter/switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement in Instrument Panel, Gages and Console.
3. Remove the voltmeter lamp socket from the back of the voltmeter.
4. Remove the bulb from the voltmeter socket.



Installation Procedure

Important: Use a standard 194 bulb for replacement.

1. Install the bulb into the voltmeter socket.
2. Install the lamp socket into the voltmeter.
3. Install the voltmeter/switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement in Instrument Panel, Gages and Console.
4. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

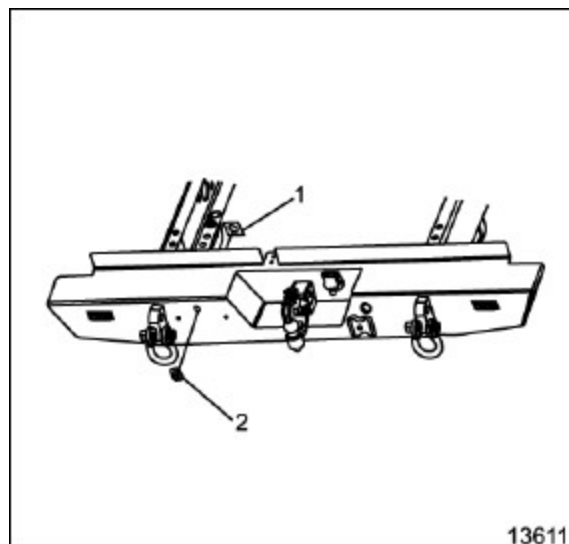


License Plate Lamp Replacement

Removal Procedure

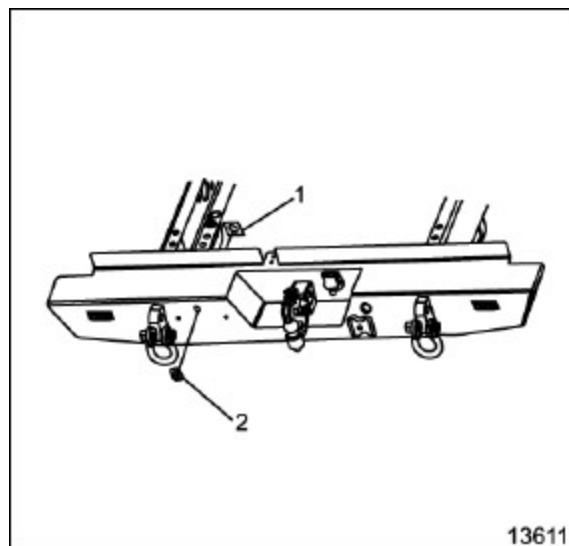
1. Ensure the headlamp switch is in the OFF position.
2. Remove the bulb socket and bulb from the back of the lamp (2).

3. Slide the retainer clip (1) off of the license plate lamp (2).
4. Remove the license plate lamp (2) from the bumper.

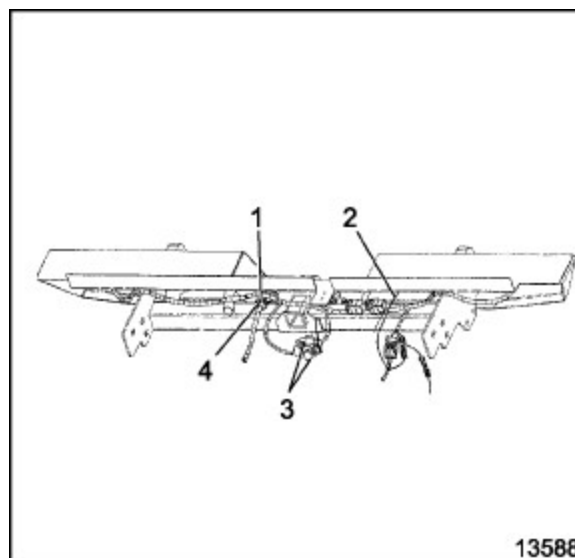


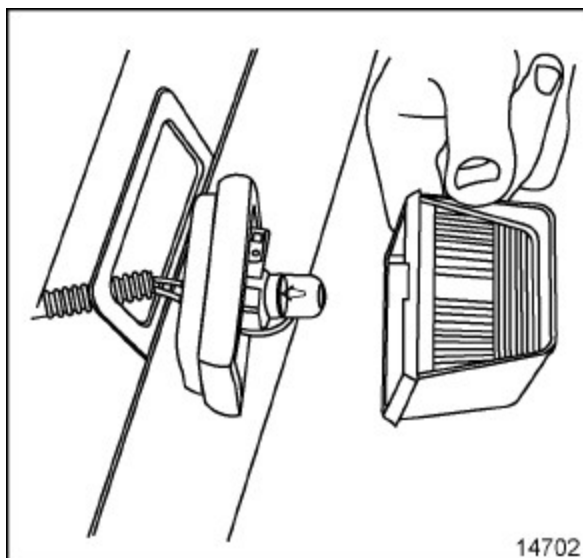
Installation Procedure

1. Install the license plate lamp (2) into the opening of the bumper.
2. Hold the lamp and slide the retainer (1) onto the back of the lamp (2).



3. Install the wiring (2) to the back of the lamp.

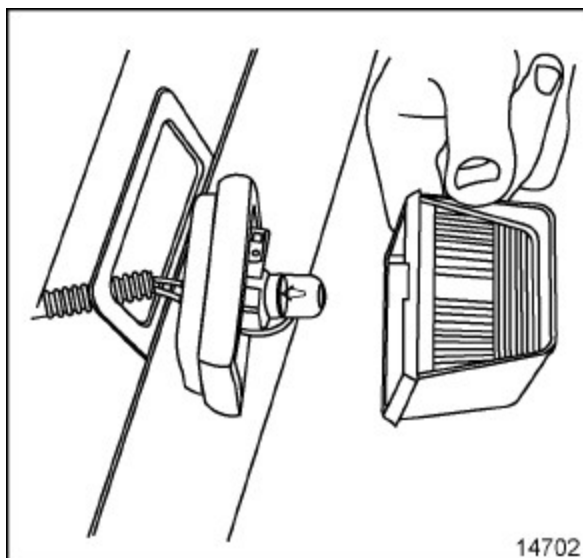




License Plate Lamp Replacement (Cable Layer)

Removal Procedure

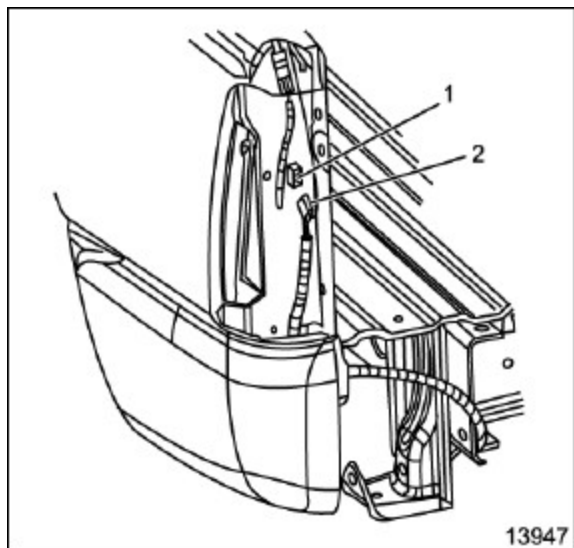
4. Ensure the headlamp switch is in the OFF position.
5. Remove the lens assembly by pull it free of the rubber housing.
6. Remove the bulb from the bulb socket.



Installation Procedure

Important: Use a bulb 1155 or 97 for replacement.

7. Install the bulb into the bulb socket.
8. Push the lens into the rubber housing until fully seated.
9. Push the lamp assembly into the housing bracket.



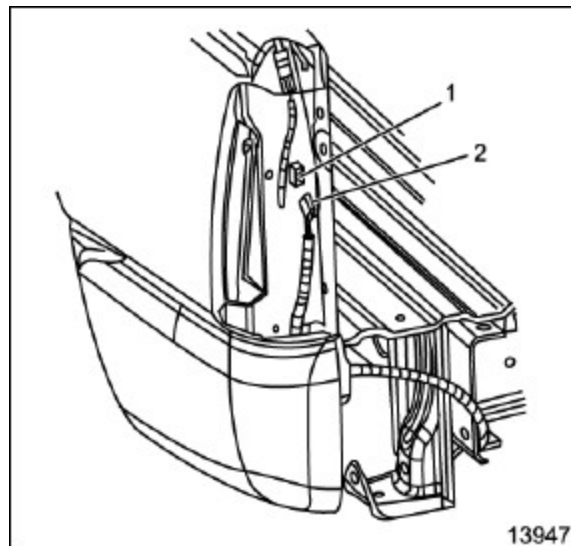
Topper Dome Lamp Switch Replacement – Rear

Removal Procedure

1. Remove the left rear tail/turn signal lamp. Refer to Tail/Turn Signal Lamp Replacement except step side in C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
2. Remove the connector (2) from the switch.
3. From inside the cargo area remove the nut from the switch.
4. Remove the switch (1) from the vehicle.

Installation Procedure

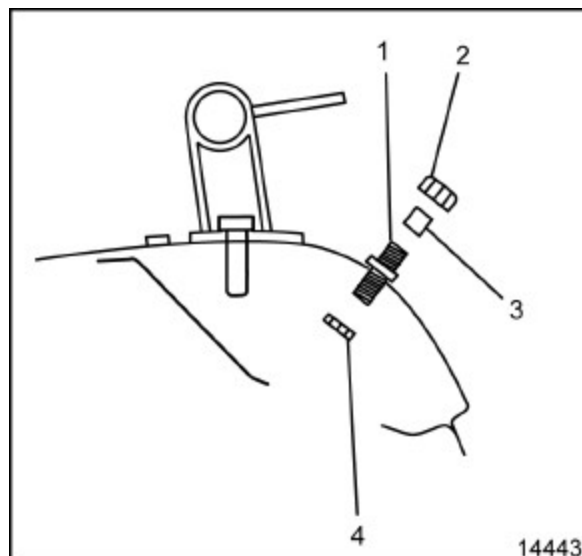
1. Install the switch (1) into the vehicle.
2. From inside the cargo area install the nut onto the switch.
3. Install the connector (2) onto the switch.
4. Install the left rear tail/turn signal lamp. Refer to Tail/Turn Signal Lamp Replacement except step side in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



Cord Grip Replacement

Removal Procedure

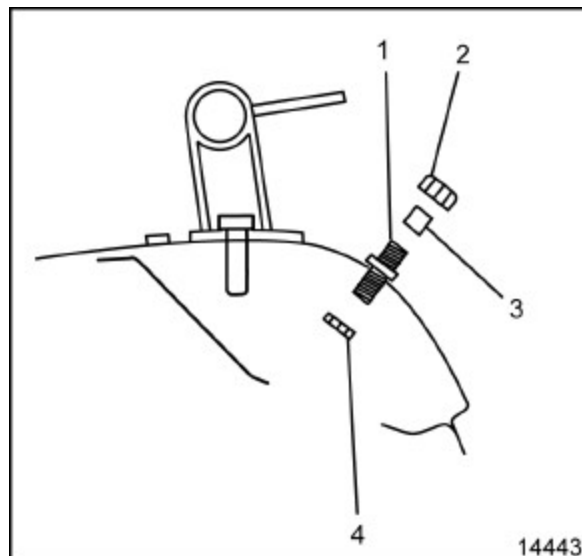
1. Remove the wiring harness from the beacon. Refer to Beacon Replacement.
2. Remove the beacon connectors from the harness.
3. Remove interior trim panels as required to gain access to the cord grip.
4. Remove the dome nut (2).
5. Remove the seal (3) and pull harness into the vehicle.
6. Remove the lock nut (4) and cord grip body (1) from vehicle.

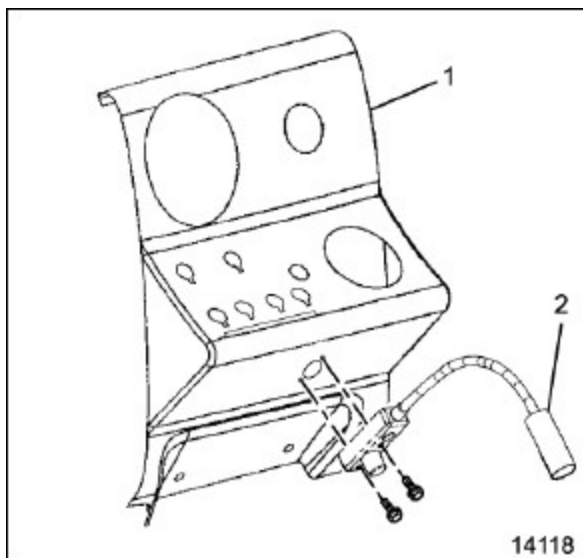


Installation Procedure

Notice: Refer to Fastener Notice in Caution and Notices.

1. Install the cord grip body (1) and locknut (4).
Tighten
Tighten locknut to 3.75 N•m (33 lb in).
2. Push wiring harness through cord grip and install seal (3).
3. Install the dome nut (2).
Tighten
Tighten nut to 2.50 N•m (22 lb in).
4. Install the removed interior panels.
5. Install beacon harness terminals.
6. Install the wiring harness to the beacon. Refer to Beacon Replacement.

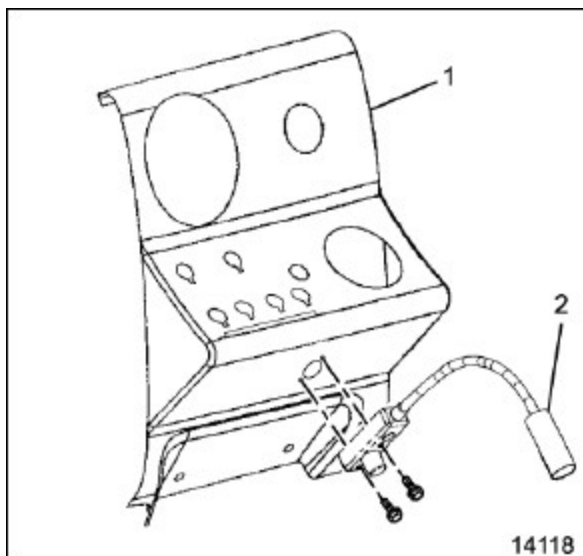




Map Light Replacement

Removal Procedure

1. Remove the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
2. Disconnect the electrical from the map light.
3. Remove the screws from the map light.
4. Remove the map light (2) from the blackout (B/O) panel (1).



Installation Procedure

1. Install the map light (2) into the blackout (B/O) panel and install screws.
2. Connect the electrical harness to the map light.
3. Install the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.

Description and Operation

Blackout (B/O) Lighting Circuit Operation

Voltage for connector C8 the blackout (B/O) marker lamps is supplied through the accessory voltage circuit YEL (243) located in the I/P relay centre. From there the ORN (40) wire supplies voltage to the blackout (B/O) service drive switch. When the blackout (B/O) service switch is placed in blackout (B/O) mode, voltage is applied to PNK (911) wire to inline fuse B. Voltage is then applied to the BRN/WHT (900) wire for front blackout (B/O) marker lamps and BRN/WHT (900) wire for rear blackout (B/O) marker lamps. Ground for the front blackout (B/O) marker lamps is supplied through G113 for the front and G401 and G402 for the rear.

The blackout (B/O) stoplamps voltage is supplied through stop LP fuse ORN (1540) wire to the TCC/stoplamp switch at all times. When the brake pedal is depressed the stoplamp switch is closed and powers the WHT (17) wire to the blackout (B/O) service drive switch. When in blackout (B/O) mode, voltage is applied from the DK GRN/WHT (902) wire to the blackout (B/O) stoplamps. The blackout (B/O) stoplamps receive constant ground through G401 and G402.

Blackout (B/O) Lighting Description

This section focuses on the function and service of the blackout (B/O) headlamp, the front and rear blackout (B/O) marker lamps, the service/blackout (B/O) lamp switch and the voltmeter lamp. All other lamps are covered in the C-31-Q44-000/MB-001 Operator's Instructions, Light Utility Vehicle Wheeled (LUVW). As military options the blackout (B/O) lamps provide a stealthy, low illumination alternative to standard lighting systems, also available on these vehicles. The blackout (B/O) headlamp is identical on these vehicles. The front blackout (B/O) marker lamps are mounted in the bumper of all vehicles. The rear blackout (B/O) marker lamps are arranged in the same relative positions on each of the rear bumpers.

The voltmeter lamp provides illumination to the voltmeter mounted in the dash.

The service/blackout (B/O) lamp switches, mounted at the lower centre dash, control blackout (B/O) lamp and standard lamp functions. A pair of toggles operates these switches. The blackout (B/O) drive toggle is mounted on the right. When the service light toggle is moved up to the ON position it activates all service lights and enables all normal service light functions elsewhere to be turned ON if needed. When moved to the All OFF position this toggle shuts off all lamps and auxiliary lamps. When the switch is moved to blackout (B/O) ON only the blackout (B/O) lighting will work, which includes the blackout (B/O) markers, front and rear, and the blackout (B/O) headlamp. Within the rear

marker lamps are separate colour markers. Yellow will illuminate for the brakes and red will illuminate for drive mode. The front markers illuminate in yellow. (The horn is inoperative while the blackout (B/O) toggle is in the ON position.) All warning lamps in the IP remain functional regardless of the toggle position. If the vehicle is parked for over 24 hours place the service switch in All OFF.

To operate the blackout (B/O) drive light switch pull it out and up to the ON position; this will activate the front blackout (B/O) headlamp. This will occur provided the service light/blackout (B/O) switch remains in the ON or down position. Pulling the left blackout (B/O) drive light switch out and down to the OFF position will turn it OFF. Releasing the switch from ON or OFF will cause it to return to the centre position automatically.

The following Exterior/Interior lights function tables are for the service light/blackout (B/O) control switch and determines under what conditions various exterior and interior lighting functions activate. Additional details are found in the C-31-Q44-000/MB-005 Operator's Instructions, Light Utility Vehicle Wheeled (LUVW).

Rotating Warning Lamp Circuit Operation

The tone control unit and the control switch mounted on the dash control the warning lamp. When the switch is in the warning lamp on the position the controller sends voltage on circuit 84 (ORN) to the warning lamp. The warning lamp is grounded at G.

Rotating Warning Lamp Description

The warning lamp is mounted on the antenna bar and rotates to cover a wide lighting area. It is controlled by a switch mounted in the blackout (B/O) switch panel.

There is a lens guard bolted to the antenna bar that prevents damage to the warning assembly.

The function for the warning lamp is covered in the 31-Q44-000/MB-005 Operator's Instructions, Light Utility Vehicle Wheeled (LUVW).

Topper Dome Lamp Circuit Description

When the ignition switch is on voltage from the blackout (B/O) to the interior toggle switch on circuit 912 (ORN). The voltage leaves the switch on circuit 800 (BRN) or 803 (BRN/WHT) pending on the switches position. The voltage on these circuit goes to the rear toggle switch then to the topper dome lamp on circuit (). The lamp is ground on the chimsel circuit.

Topper Dome Lamp Description

The topper dome lamp is controlled by two 3-way switches and a lamp mounted switch. The interior switch is mounted in the blackout (B/O) switch panel and the other is mount on the left rear of the pickup bid. The switch mounted on the lamp must be in the ON position for the two 3-way switches to operate the lamp.

Map Lamp Circuit Description

The Map lamp receives voltage from connector C4 cavity E and towers circuit 40 (Red). The Map lamp is ground through circuit 150 (BLK) to ground G.

Map Lamp Description

The Map lamp is mounted on the blackout (B/O) switch panel.

The Map lamp is a high intensity lamp with a removable lamp filter used for blackout (B/O) conditions. The lamp is controlled by dimmer switch mounted at the base of the lamp.

Function Tables

Exterior Lights

Exterior Lamp or Device	Service Switch	Blackout (B/O) Drive Light Switch
Headlamps and Taillamps	ON	OFF
Fog Lamps	ON	OFF
Parking Lamps	ON	OFF
Front/Rear Side Marker Lamps	ON	OFF
Marker Lamps: Roof, Fender and Tailgate	ON	OFF
Brakelamps	ON	OFF
Back-up Lamps	ON	OFF
License Plate Lamp	ON	OFF
Front/Rear Turn Signals	ON	OFF
Hazard Warning Lamps	ON	OFF
Cargo Lamp	ON	OFF
Horn	ON	OFF
Front/Rear Blackout (B/O) Marker Lamps	B/O	ON/OFF
Blackout (B/O) Stoplamps	B/O	ON/OFF
Blackout (B/O) Drive Lamp (Headlamp)	B/O	ON

Interior Lights

Interior Lamp or Device	Service Switch	Blackout (B/O) Drive Light Switch
Instrument Panel/Switch Illumination	ON	OFF
Radio/Clock ILLUMINATION *	ON	OFF
Headlamp High-Beam Indicator	ON	OFF
Turn Signal/Hazard Warning Indicators	ON	OFF
Four-Wheel-Drive Indicator	ON	OFF
Dome/Courtesy Lamps	ON	OFF
Ashtray Lamp	ON	OFF
Glove Compartment Lamp	ON	OFF
Underhood Lamp	ON	OFF
Warning Chime: Headlamps On, Safety Belt and Key in Ignition	ALL POSITIONS	OFF
Instrument Cluster Warning Lights*	ON	ON/OFF

* Clock numerals and DRL indicator will remain illuminated.

Interior Lights

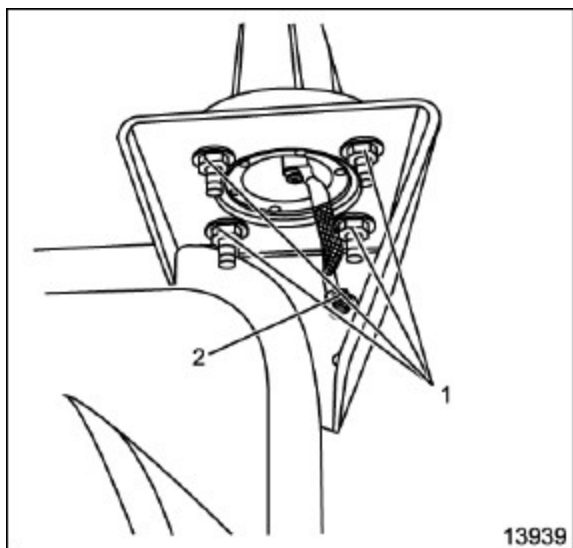
Mechanical Device	Service Switch	Blackout (B/O) Drive Light Switch
Brake-Transmission Shift Interlock (BTSI)	ON	ON/OFF
Torque Converter Lockup Clutch	ON	ON/OFF

Entertainment

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
GPS Antenna Nuts	0.23 N•m	2 lb in
Side Light Bar Bolts	40 N•m	30 lb ft
Top Light Bar Bolts and Nuts	40 N•m	30 lb ft
VHF Antenna Bolts	41-61 N•m	30-40 lb ft
VHF Antenna Side Ground Nut	12 N•m	8.9 lb ft



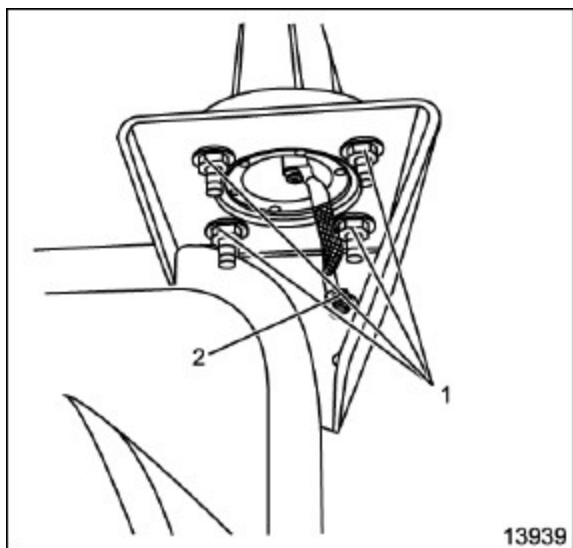
Repair Instructions

VHF Antenna Mount Replacement

Removal Procedure

Notice: Ensure all communication/navigation are OFF before disconnecting the antenna cables.

1. Remove the antenna co-axial cable from the antenna base.
2. Remove the nut (2) securing the ground strap to the light bar.
3. Remove the nuts (1) washers and bolts securing the antenna mount to the light bar.
4. Remove the antenna mount from the light bar.

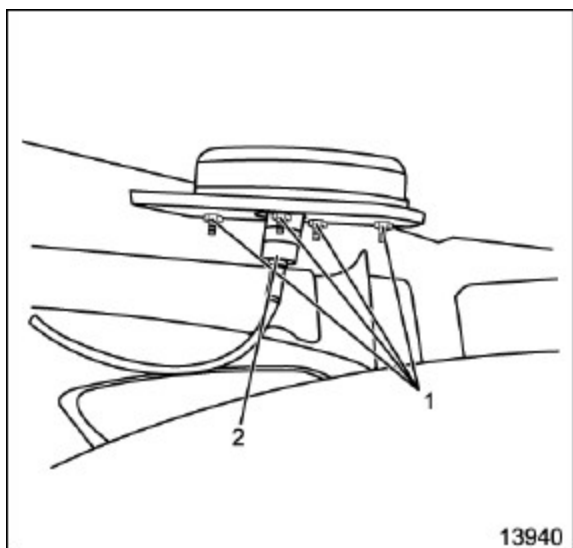


Installation Procedure

1. Install the antenna to the light bar.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts, washers and nuts (1).
Tighten
Tighten antenna mount bolts to 41-61 N•m (30-40 lb ft).
3. Install the nut (2) securing the ground strap to the light bar.
Tighten
Tighten to 12 N•m (8.9 lb ft).
4. Install the antenna co-axial cable to the antenna.



GPS Antenna Replacement

Removal Procedure

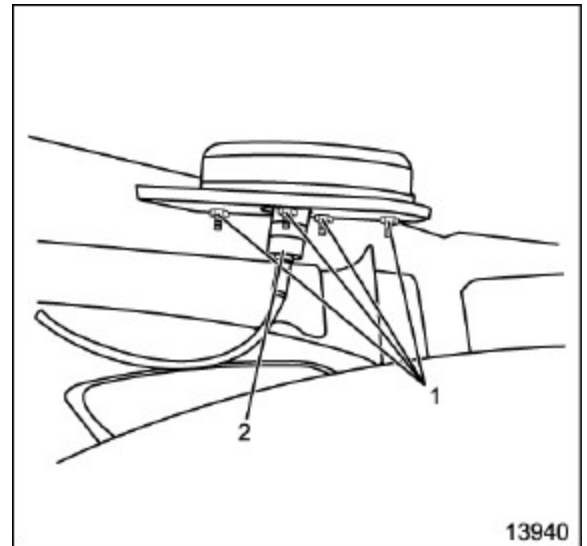
Notice: Ensure all communication/navigation are OFF before disconnecting the antenna cables.

1. Disconnect the antenna cable (2) from the antenna.
2. Remove the antenna nuts (1).
3. Remove the antenna from the bracket.

Installation Procedure

Notice: Refer to Fastener Notice in Cautions and Notices.

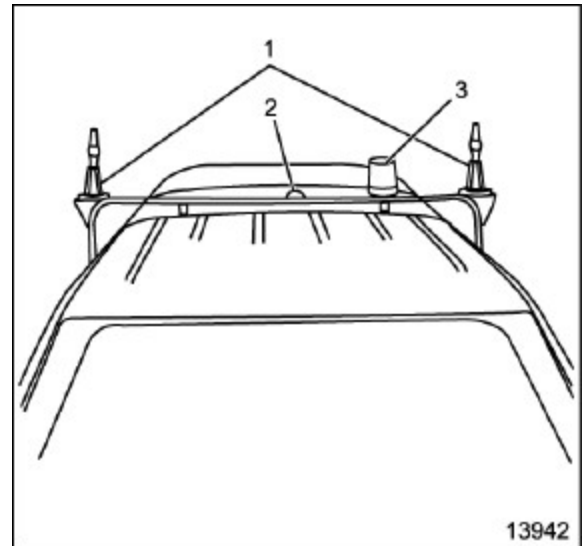
1. Install the antenna to the bracket, and install the nuts (1).
Tighten
Tighten antenna nuts 0.23 N•m (2 lb in).
2. Install the antenna cable (2).



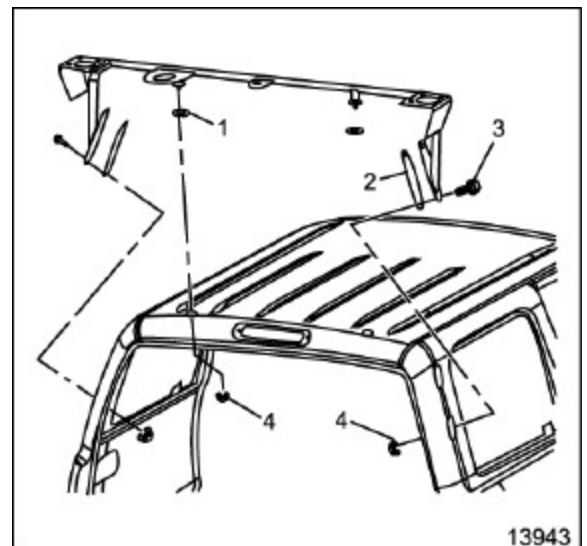
Light Bar Replacement

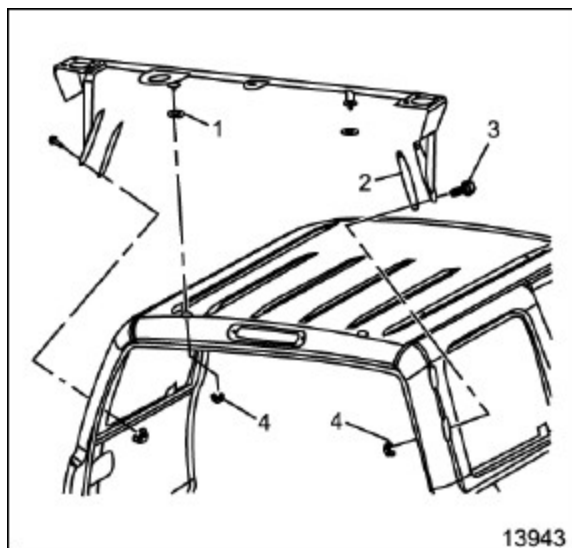
Removal Procedure

1. Remove both VHF antenna mounts (1). Refer to VHF Antenna Mount Replacement.
2. Remove the GPS antenna (2). Refer to GPS Antenna Replacement.
3. Remove the beacon light (3). Refer to Beacon Replacement in Lighting Systems.



4. Remove the rear seat and the seat backs. Refer to Seat Back Replacement – Rear in Seats.
5. Remove both rear quarter trim panels. Refer to Trim Panel Replacement-Rear Quarter Crew Cab in Interior Trim in the C-13-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
6. Remove the rear portion of the headliner, enough to gain access to the 2 roof nuts (4).
7. Remove the 2 roof light bar bolts and ground straps.
8. Remove the 2 light bar side nuts (4) and bolts (3).
9. Carefully remove the light bar from the vehicle.
10. Remove the gasket material from the light bar mounting points.





Installation Procedure

1. Install new gaskets to the light bar mounting points.
2. Install the light bar to the vehicle lining up the mounting holes and gaskets.

Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the bolts (3) and nuts (4) for both sides and tighten.

Tighten

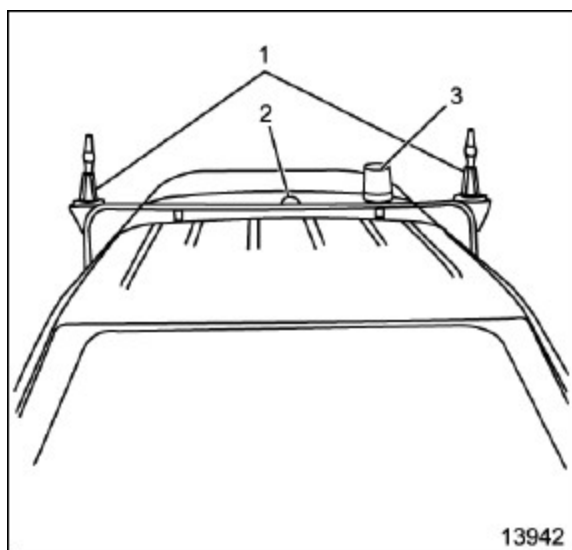
Tighten side light bar bolts to 40 N•m (30 lb ft).

4. Install the top light bar ground strap and nuts (4).

Tighten

Tighten top light bar bolts and nuts to 40 N•m (30 lb ft).

5. Install the rear of the headliner.



6. Install both rear and quarter trim panels. Refer to Trim Panel Replacement-Rear Quarter Crew Cab in Interior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
7. Install the rear seat backs. Refer to Seat Back Replacement – Rear in Seats.
8. Install the beacon light (3). Refer to Beacon Replacement in Lighting Systems.
9. Install the GPS antenna (2). Refer to GPS Antenna Replacement.
10. Install both the VHF antenna mounts (1). Refer to VHF Antenna Mount Replacement.

Instrument Panel, Gages and Console

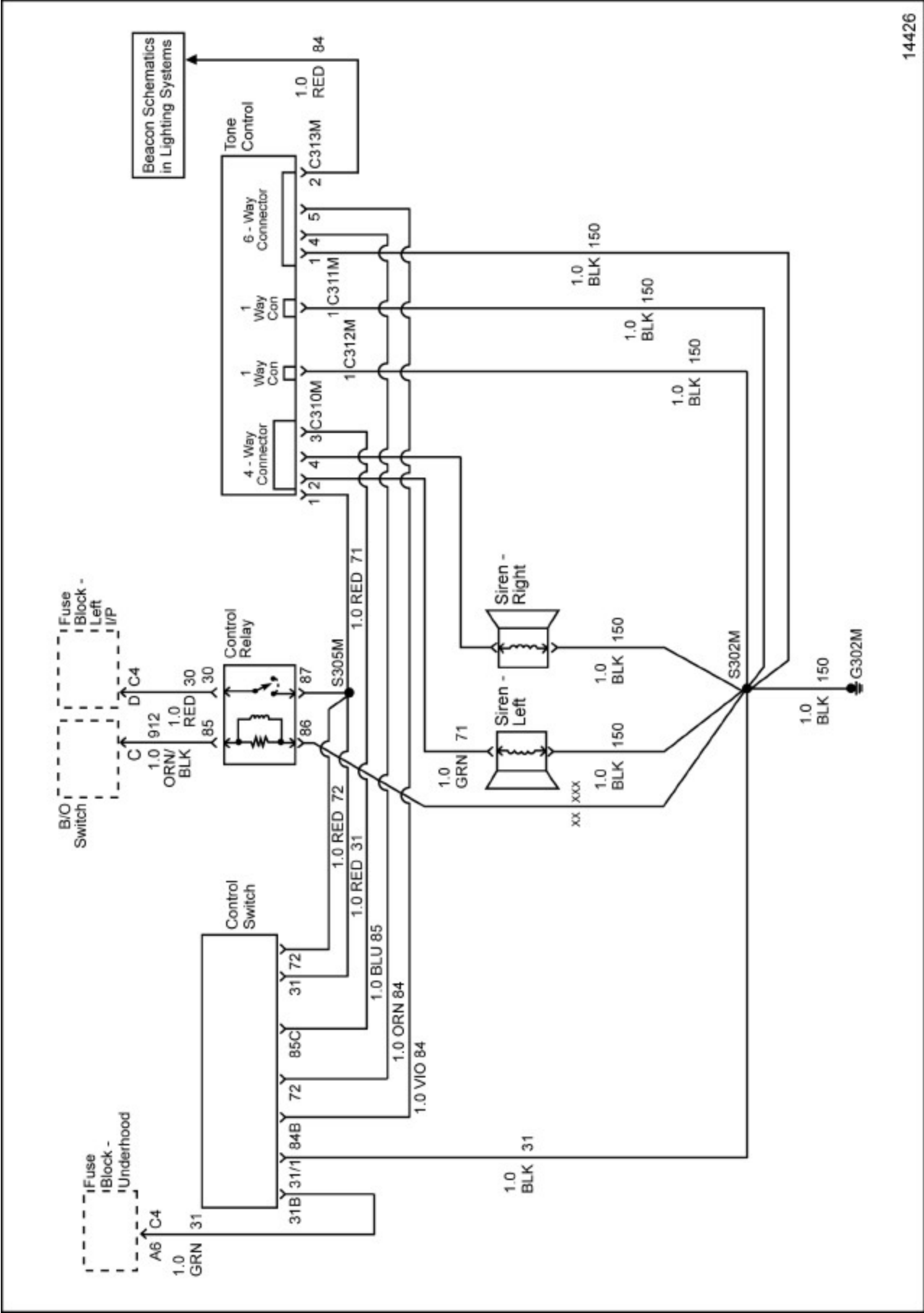
Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Battery Cable Connections	17 N•m	13 lb ft
Blackout (B/O) Switch Nuts	2.8 N•m	2 lb ft
Blackout (B/O) Switch Panel Bolts	7-9 N•m	5-7 lb ft
Controller Bolts	7-11 N•m	5-8 lb ft
Voltmeter Nuts	2.8 N•m	2 lb ft

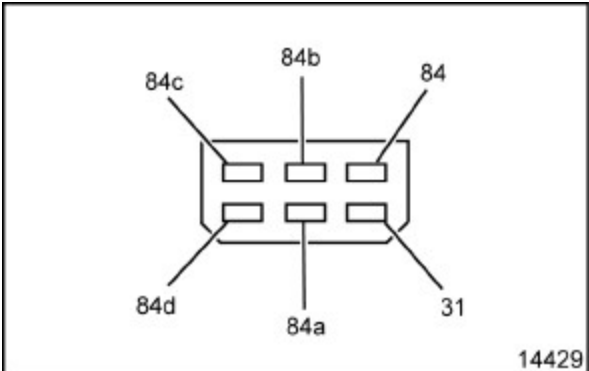
Schematic and Routing Diagrams

MP Controls

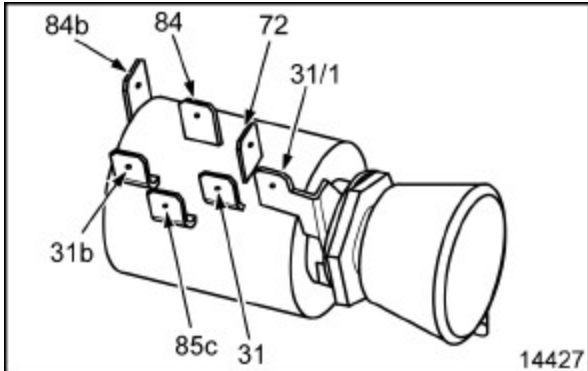


Connector End Views

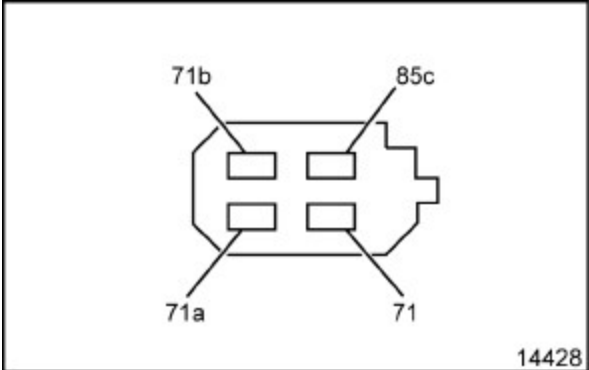
Tone Controller

			
Connector Part Information		<ul style="list-style-type: none"> Connector C313M 6-Way F (BLK) 	
Pin	Wire Colour	Circuit No.	Function
84	BLK	150	Ground
84a	VOL	84	To Control Switch
84b	RED	84	To Beacon
84c	—	—	Not Used
84d	—	—	Not Used
31	ORN	84	To Control Switch

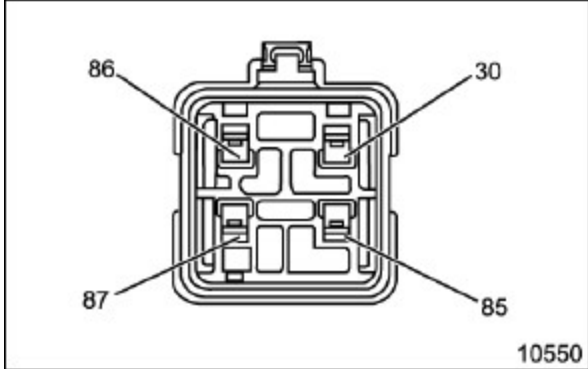
MP Switch

			
Connector Part Information		<ul style="list-style-type: none"> MP Switch 7 Individual 1-way, F, B972 	
Pin	Wire Colour	Circuit No.	Function
84b	VOL	84	To Tone Controller
84	ORN	84	To Tone Controller
72	RED	72	Power from Relay
31/1	BLK	31	Ground
31	RED	31	Power from Relay
85c	BLU	85	To Tone Controller
31b	DK GRN	31	To Horn

Tone Controller

			
Connector Part Information		<ul style="list-style-type: none"> Connector C313M 4-Way F (BLK) 	
Pin	Wire Colour	Circuit No.	Function
71	RED	71	Power from Relay
71a	GRN	71	Right Siren
71b	WHT	71	Left Siren
85c	BLU	85	To Control Switch

Control Relay

			
Connector Part Information		<ul style="list-style-type: none"> 12129716 4-Way F M/P Series 280 (GRY) 	
Pin	Wire Colour	Circuit No.	Function
30	RED	30	Control Power from Fuse Block – Left I/P
85	ORN/BLK	912	From Blackout (B/O) Switch
86			Ground
87			Power to Switch/Controller

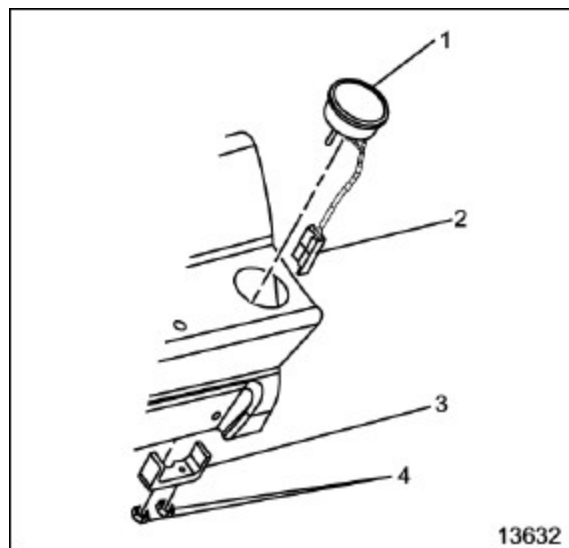
Repair Instructions

Voltmeter Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the voltmeter, blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
3. Remove the nut (4) from the back of the voltmeter.
4. Remove the gage bracket (3) and remove the voltmeter (1) from the switch panel.

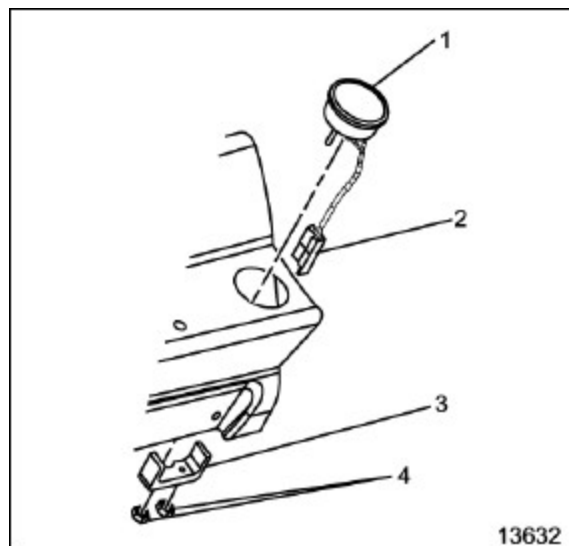


Installation Procedure

1. Install the voltmeter (1) into the switch panel opening.
2. Install bracket (3) on back of voltmeter.

Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install nuts (4) on the voltmeter studs.
Tighten
Tighten nuts to 2.8 N•m (2 lb ft).
4. Install the voltmeter blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

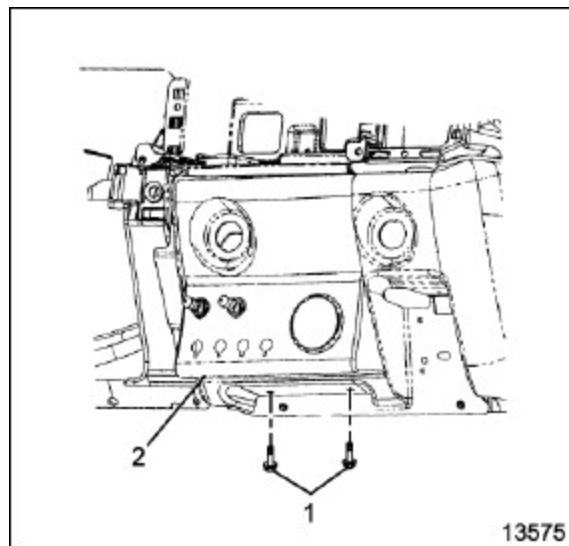


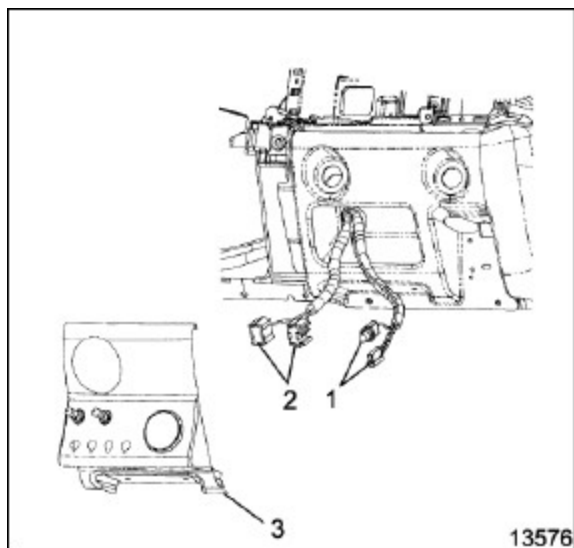
Voltmeter/Blackout (B/O) Switch Panel Replacement

Removal Procedure

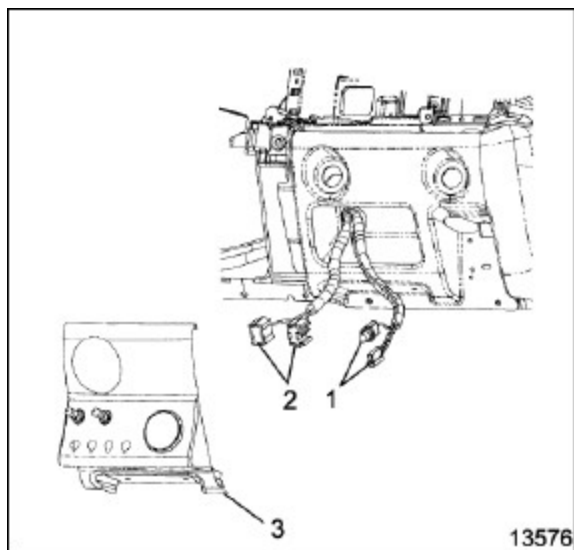
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the bolts (1) from the switch panel.
3. Move the switch panel (2) out far enough to gain access to the harness connections.



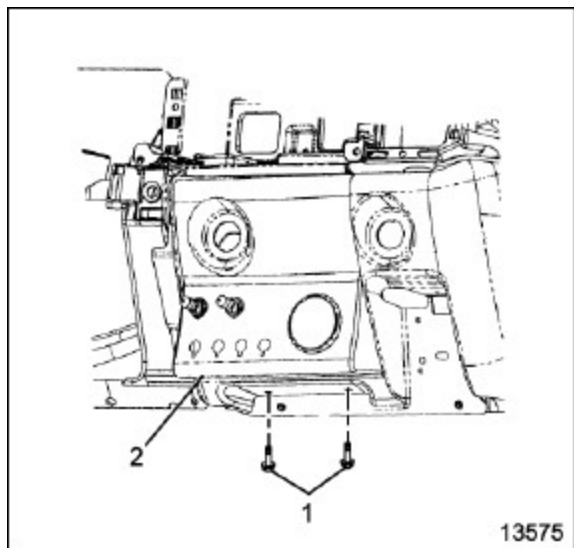


4. Disconnect the 24V gage bulb and harness connectors (1) from the gage.
5. Disconnect the blackout (B/O) harness connectors (2) from the switches.
6. Disconnect the power receptacle.
7. Disconnect the siren switch.
8. Disconnect the map light.
9. Remove panel (3) from the vehicle.
10. Remove parts from the switch panel. Refer to Voltmeter Replacement or Blackout (B/O) Switch Replacement.



Installation Procedure

1. Install the parts removed from the switch panel. Refer to Voltmeter Replacement or Blackout (B/O) Switch Replacement.
2. Install connectors (2) to the blackout (B/O) switches.
3. Install the connector and bulb (1) to the 24V gage.
4. Connect the power receptacle.
5. Connect the siren switch.
6. Connect the map light.



7. Install the switch panel (2) onto the dash.

Notice: Refer to Fastener Notice in Cautions and Notices.

8. Install the bolts (1) and tighten.

Tighten

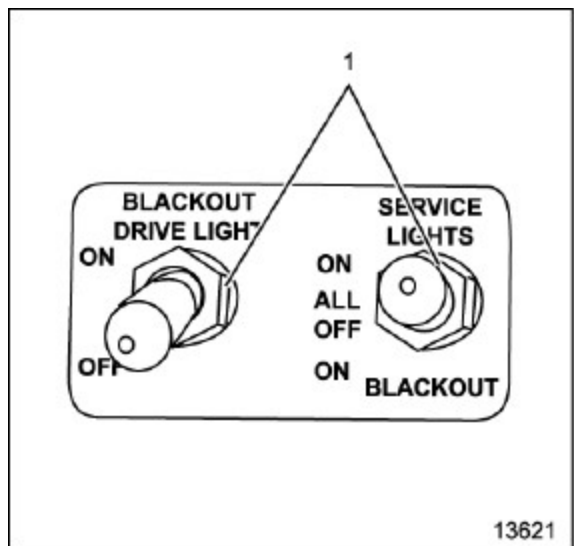
Tighten switch panel bolts to 7-9 N•m (5-7 lb ft).

Blackout (B/O) Switch Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the voltmeter, blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
3. Remove the nuts (1) and washers holding the blackout (B/O) switches.
4. Remove the keyed washers from the I/P mounting panel and pull the switches out.

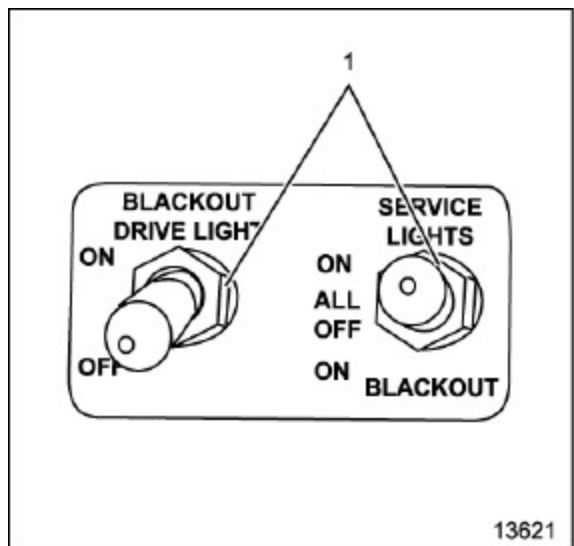


Installation Procedure

1. Install the switches through the switch panel.
2. Install the keyed washers on the switches.

Notice: Refer to Fastener Notice in Cautions and Notices.

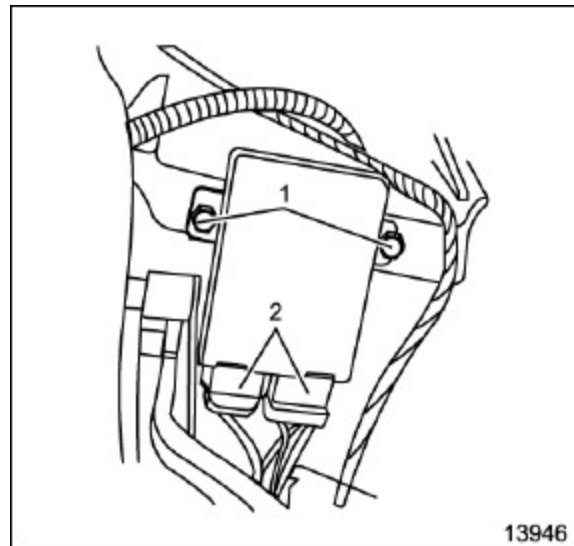
3. Install the 2 washers and nuts (1) on the switch panel.
Tighten
Tighten the 2 nuts to 2.8 N•m (2 lb ft).
4. Install the voltmeter, blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement in Instrument Panel.
5. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

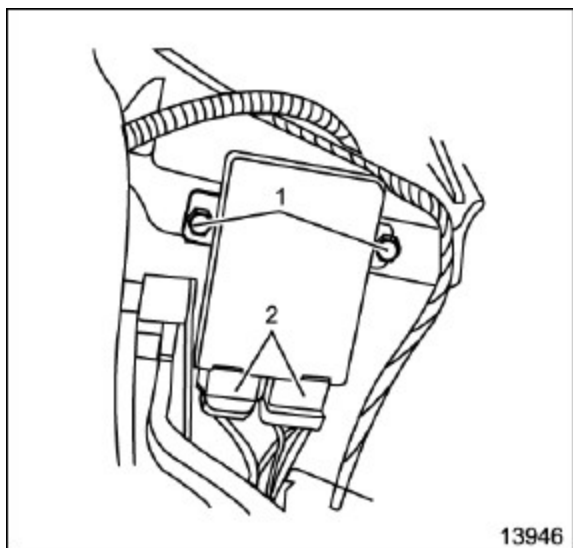


Siren/Beacon Controller Replacement

Removal Replacement

1. Remove the controller bolts (1).
2. Remove the wiring harness connectors (2).





Installation Procedure

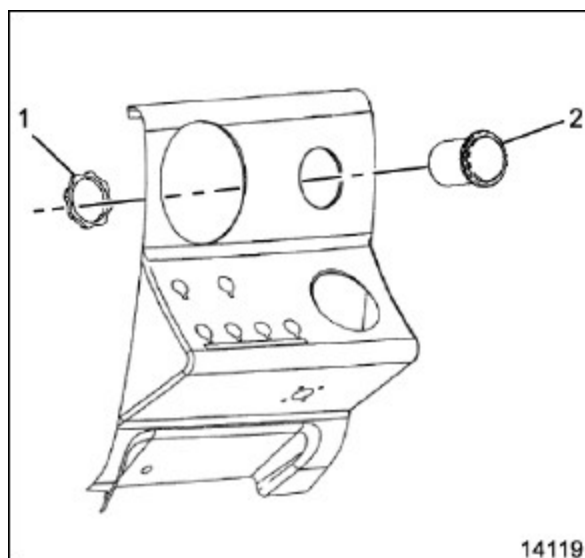
1. Install the wiring harness connectors (2).

Notice: Refer to Fastener Notice in Cautions and Notices

2. Install the siren control to the vehicle and install bolts (1).

Tighten

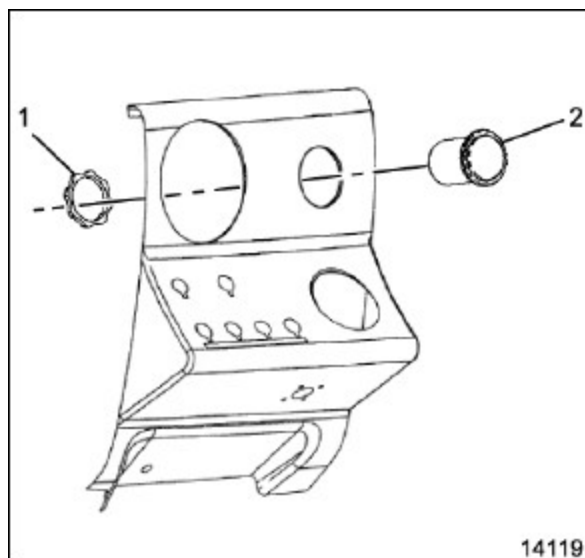
Tighten controller bolts to 7-11 N•m (5-8 lb ft).



12 V Receptacle Replacement

Removal Procedure

1. Remove the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
2. Disconnect the wiring harness from the receptacle.
3. Remove the nut (1) from the receptacle (2) and remove.



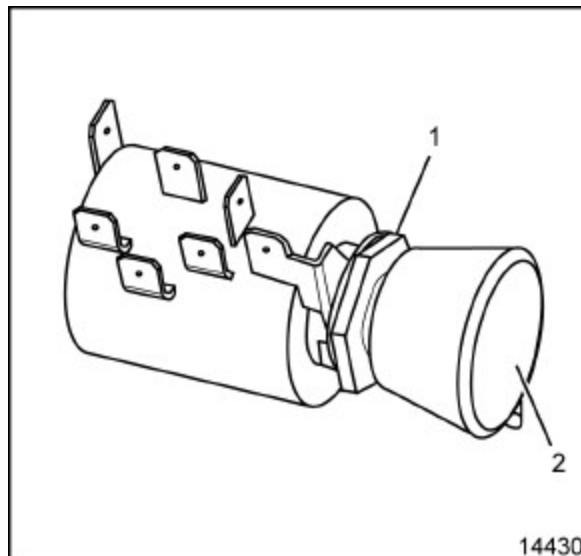
Installation Procedure

1. Install the receptacle (2) into the blackout (B/O) panel.
2. Install the nut (1) onto the receptacle.
3. Connect the wiring harness to the receptacle.
4. Install the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.

Siren Switch Replacement

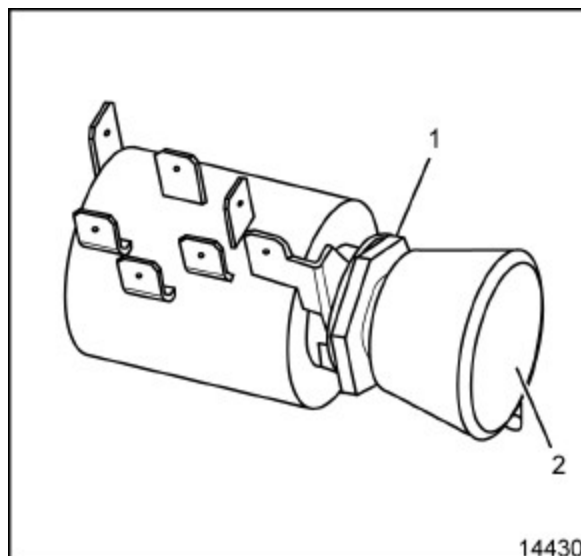
Removal Procedure

1. Remove the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.
2. Remove the wiring harness from the switch.
3. Unscrew the red centre lens (2) from the switch knob.
4. Remove the knob and nut (1) from the switch.
5. Remove the switch label and remove the switch from the blackout (B/O) panel.



Installation Procedure

1. Install the switch into the blackout (B/O) panel.
2. Install the switch label and nut (1).
3. Install the knob and screw in the centre lens (2).
4. Connect the wiring harness to the switch.
5. Install the blackout (B/O) switch panel. Refer to Voltmeter/Blackout (B/O) Switch Panel Replacement.



Description and Operation

Instrument Panel and Gages Description

The instrument panel has been modified with a panel mounted below the accessory power outlets. This panel houses the blackout (B/O) lighting auxiliary switches and 24V meter. The instrument panel houses auxiliary harnesses as well as standard indicators.

Some modifications have been made to the instrument panel to accommodate auxiliary harness connections and convenience/fuse centres.

Horns

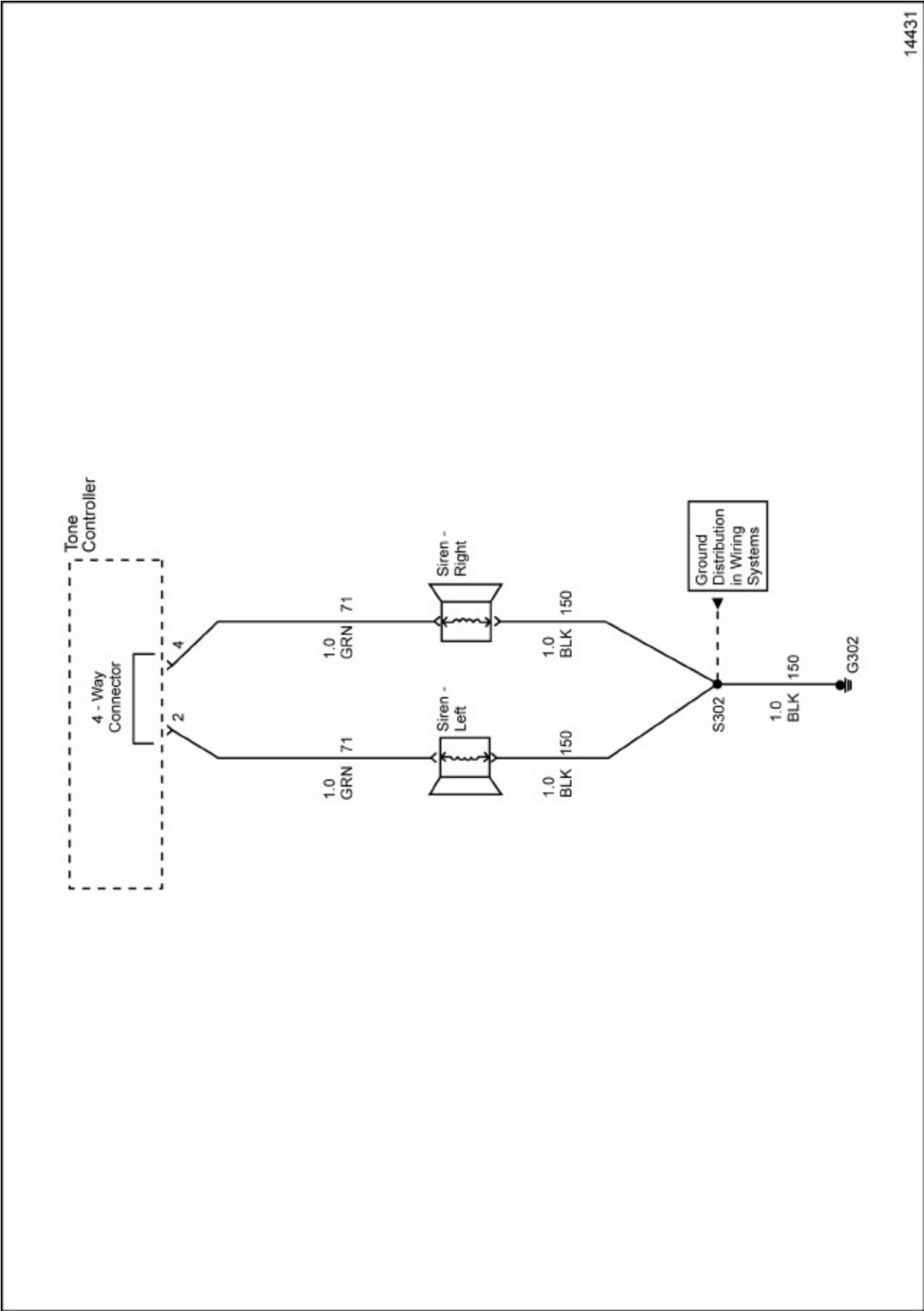
Specifications

Fastener Tightening Specifications

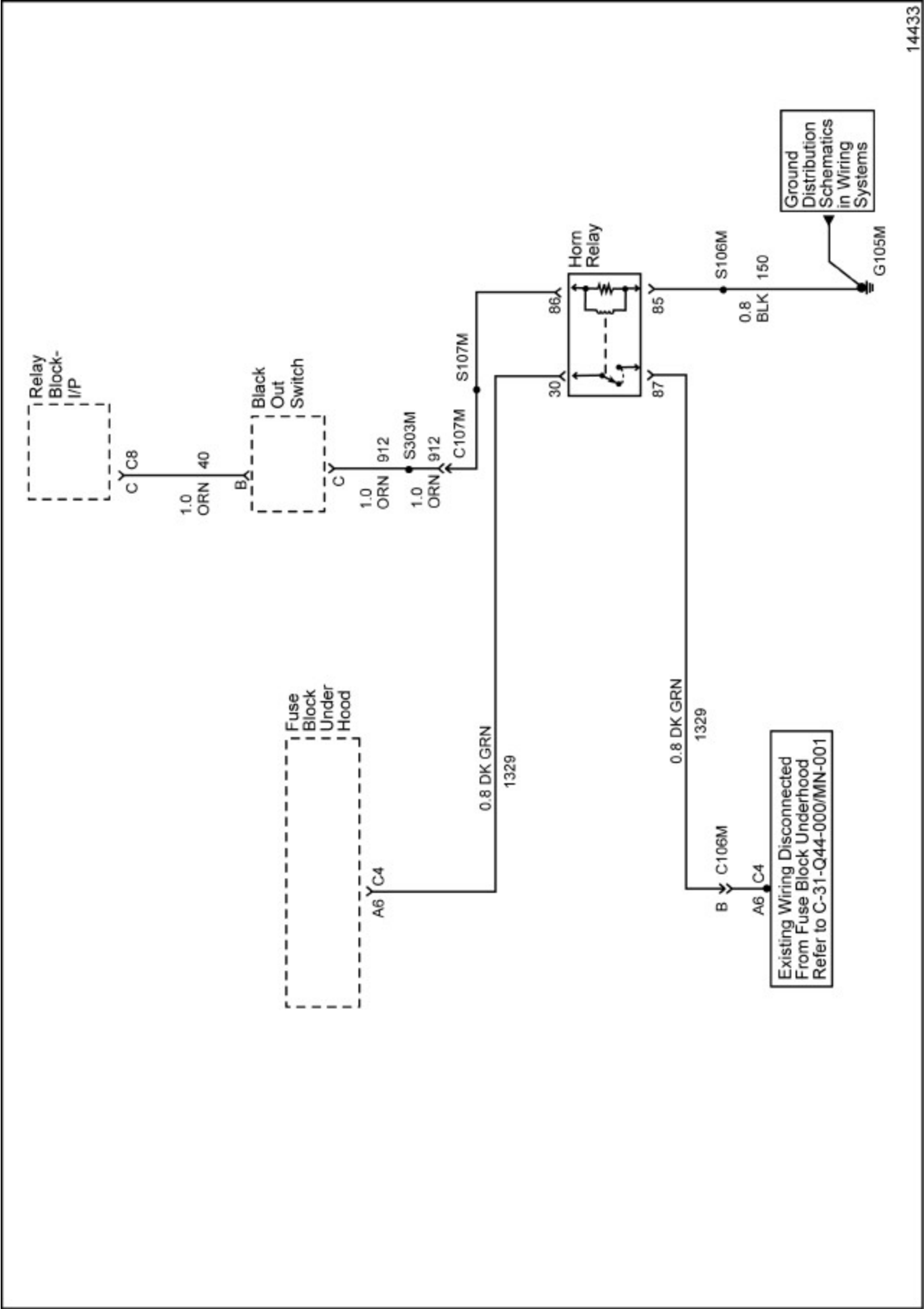
Application	Specification	
	Metric	English
Siren Mounting Bolt	40-60 N•m	30-44 lb ft

Schematic and Routing Diagrams

MP Sirens



Horns



Diagnostic Information and Procedures

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Horns Inoperative
- Horns Operate in Blackout (B/O) Mode

Horns Inoperative

Step	Action	Yes	No
Schematic Reference: Horn Schematics			
1	Did you review Horns Description and Operation?	Go to Step 2	Go to Description and Operation
2	Depress the horn switch. Does either horn operate?	Go to Horns Inoperative – One Horn in Horns of C-31-Q44-000/MN-001	Go to Step 3
3	1. Remove the horn interrupt relay. 2. Connect a jumper between terminal 30 and 87 of the relay block. 3. Depress the horn switch. Does the horn operate?	Go to Step 4	Go to Horns Inoperative in Horns of C-31-Q44-000/MN-001
4	Connect a test lamp between terminal 86 of the relay block and ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 5
5	Connect a test lamp between terminal C of the blackout (B/O) service switch and ground. Does the test lamp illuminate?	Go to Step 7	Go to Step 8
6	Connect a test lamp between terminal 85 of the relay block and ground. Does the test lamp illuminate?	Go to Step 9	Go to Step 10
7	Repair the open or high resistance in the (ORN) circuit 912. Did you complete the repair?	Go to Step 13	—
8	Connect a test lamp between terminal B of the blackout (B/O) service switch and ground. Does the test lamp illuminate?	Go to Step 11	Go to Step 12
9	Repair the open or high resistance in the (BLK) circuit 150. Did you complete the repair?	Go to Step 13	—
10	Replace the horn interrupt relay. Did you complete the repair?	Go to Step 13	—
11	Replace the blackout (B/O) service switch. Did you complete the replacement?	Go to Step 13	—

Horns Inoperative (cont'd)

Step	Action	Yes	No
12	Repair the open or high resistance in the (ORN) circuit 40. Did you complete the repair?	Go to Step 13	—
13	Verify the system operation. Do the horns operate properly?	System OK	Go to Step 2

Horns Operate in Blackout (B/O) Mode

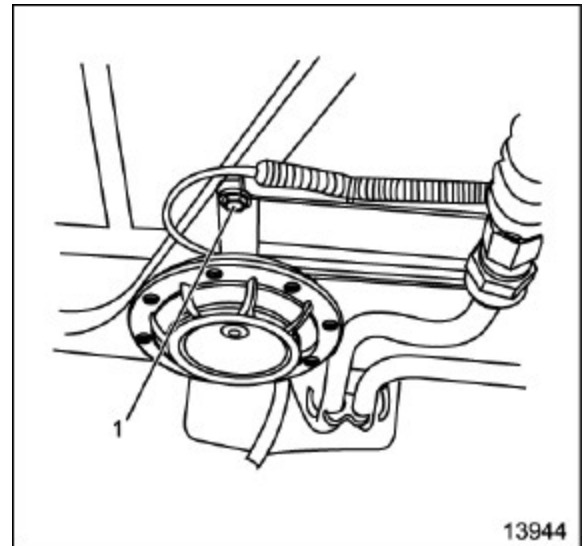
Step	Action	Yes	No
Schematic Reference: Horn Schematics			
1	Did you review Horns Description and Operation?	Go to Step 2	Go to Description and Operation
2	Connect a test lamp between terminal 86 of the horn interrupt relay block and ground. Does the test lamp illuminate?	Go to Step 4	Go to Step 3
3	Replace the horn interrupt relay. Did you complete the replacement?	Go to Step 7	—
4	1. Disconnect the blackout (B/O) service switch and ground. 2. Connect a test lamp between cavity C of the blackout (B/O) switch connector and ground. Does the test lamp illuminate?	Go to Step 6	Go to Step 5
5	Replace the blackout (B/O) service lamp switch. Did you complete the replacement?	Go to Step 7	—
6	Repair the short to voltage in the (ORN) circuit 912. Did you complete the repair?	Go to Step 7	—
7	Verify the system operation. Do the horns operate properly?	System OK	Go to Step 2

Repair Instructions

Siren Replacement

Removal Procedure

1. Remove the front grille. Refer to Grille Replacement Chevrolet in Exterior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
2. Remove the bolt (1) securing the siren to the radiator support.
3. Remove the wiring connectors from the siren.

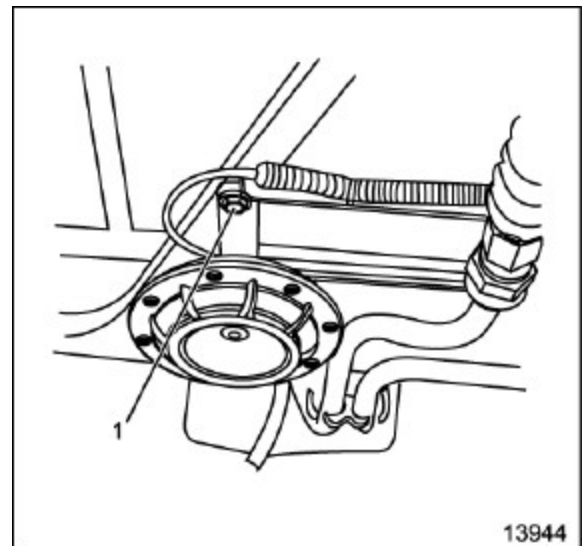


Installation Procedure

1. Install the wiring connectors on the siren.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the siren to the support and install the bolts (1).
Tighten
Tighten siren bolt to 40-60 N•m (30-44 lb ft).
3. Install the front grille. Refer to Grille Replacement Chevrolet in Exterior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



Description and Operation

Horn with Blackout (B/O) Control Circuit Operation

Voltage is applied at all times to the horn relay through the 15A horn fuse in the Underhood fuse block. The blackout (B/O) service drive switch is used to control the horn relay. Power is applied through ORN (circuit 40) to the blackout (B/O) service drive switch which is a normally closed switch. When the horn switch is depressed, the horn switch contacts close, providing a ground to the coil of the horn relay. When the coil of the relay is grounded, the relay energizes and the contacts close, applying battery voltage directly to the LH and RH horn. Because the horns are grounded at Ground (G112) the horns will sound as long as the horn switch is depressed.

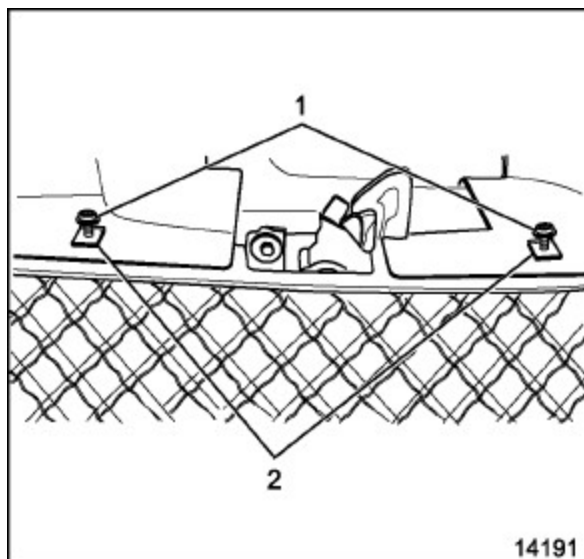
The blackout (B/O) service drive switch is used to disable the horn relay when placed in the blackout (B/O) mode. When the blackout (B/O) service drive switch is in the ON position, power to the horn relay is disrupted leaving the horns inoperative.

Exterior Trim

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Military Police Sign Bolts – Front	10-14 N•m	7.5-10 lb ft
Military Police Sign Bolts – Rear	9-11 N•m	7-8 lb ft
Military Police Sign Inner Clamps Bolts	10-14N•m	7.5-10 lb ft
Military Police Sign Outer Clamps Bolts	10-14N•m	7.5-10 lb ft

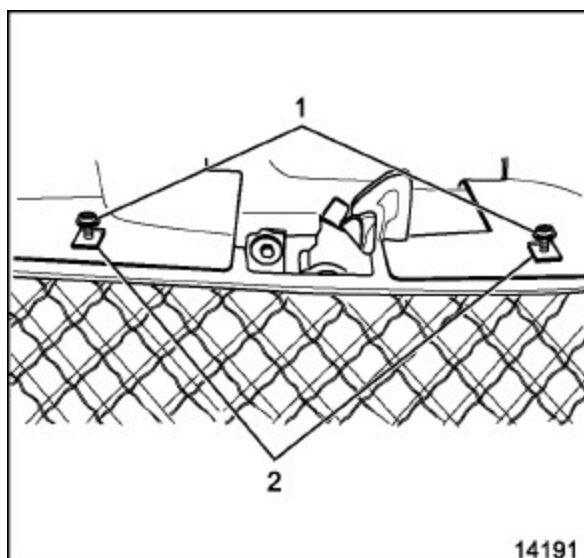


Repair Instructions

Winter Front Grille Cover Fastener Replacement

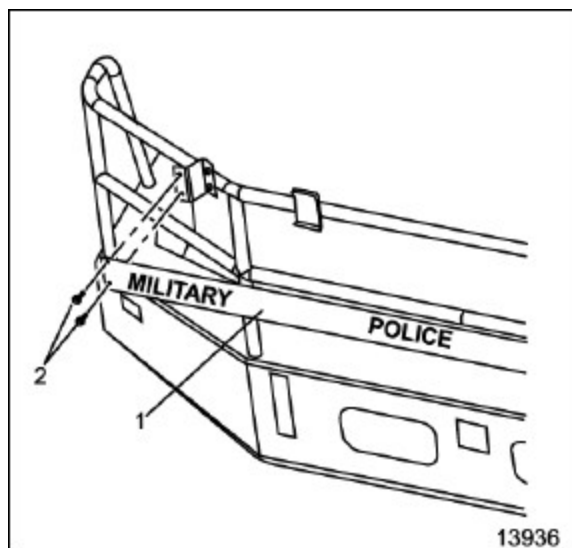
Removal Procedure

1. Remove the screw (1) from the plug and the snap.
2. Remove the plug (2) by depressing the tabs on the side of the plug.



Installation Procedure

1. Position the plug (2) into the mounting location provided for the winter front cover.
2. Install the screw (1) onto the snap and the plug.
3. Tighten the screw.



Military Police Sign Replacement – Front

Removal Procedure

1. Remove the bolts (2) from the mounting bracket.
2. Remove the sign (1) from the bumper assembly.

Installation Procedure

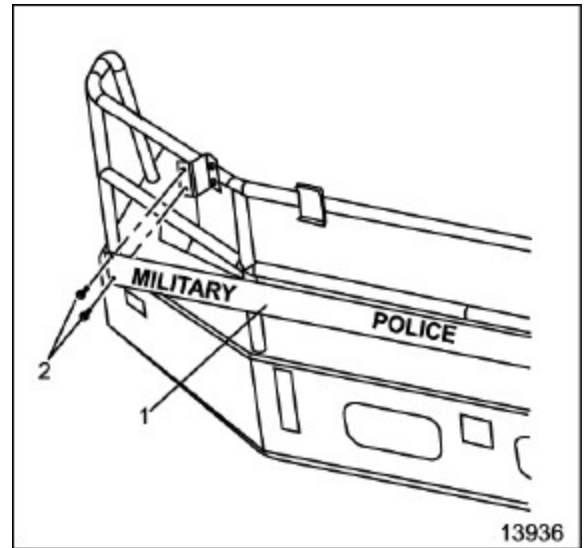
1. Install the sign (1) to the bracket and align holes.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (2) and tighten.

Tighten

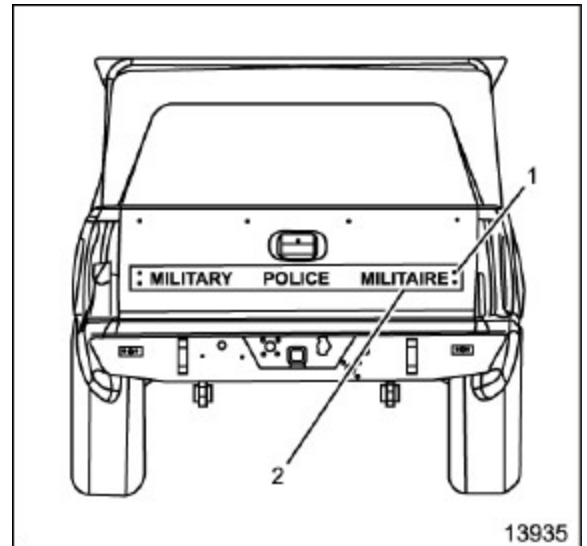
Tighten sign bolts to 10-14 N•m (7.5-10 lb ft).



Military Police Sign Replacement – Rear

Removal Procedure

1. Remove the bolts (1).
2. Remove the sign (2) from the vehicle.



Installation Procedure

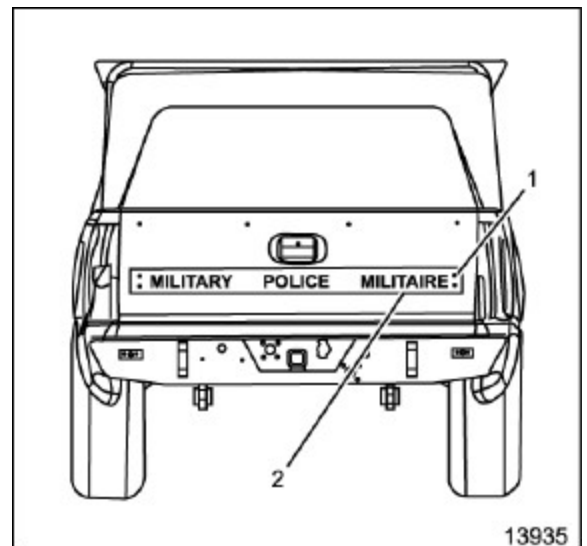
1. Install the sign (2) to the back of the vehicle aligning the holes.

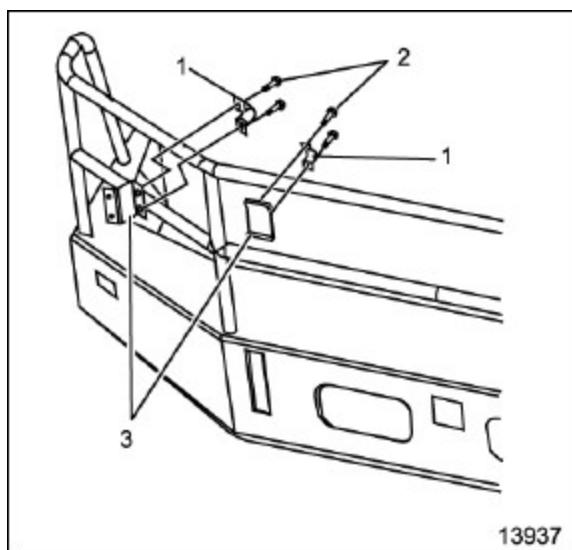
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (1) and tighten.

Tighten

Tighten sign bolts to 9-11 N•m (7-8 lb ft).

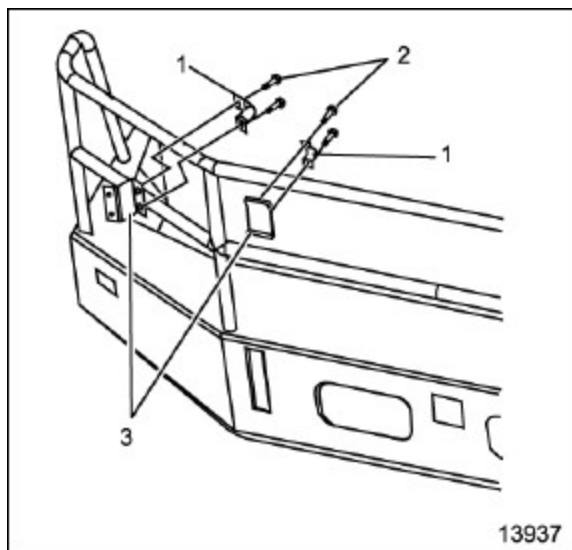




Military Police Sign Bracket Replacement

Removal Procedure

1. Remove the front military police sign. Refer to Military Police Sign Replacement – Front.
2. Remove the bolts (2) securing the brackets to the bumper assembly.
3. Mark position of brackets for installation.
4. Remove clamps (1) and brackets (3).



Installation Procedure

1. Install the brackets (3) and clamps (1).

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (2) and adjust brackets to alignment marks.

Tighten

- Tighten outer clamp bolts to 10-14 N•m (7.5-10 lb ft).
 - Tighten inner clamp bolts to 10-14 N•m (7.5-10 lb ft).
3. Install the military police sign. Refer to Military Police Sign Replacement – Front.

Description and Operation

Exterior Trim Description

The military police models are equipped with reflective signs one on the front bumper assembly and the other on the rear end gate.

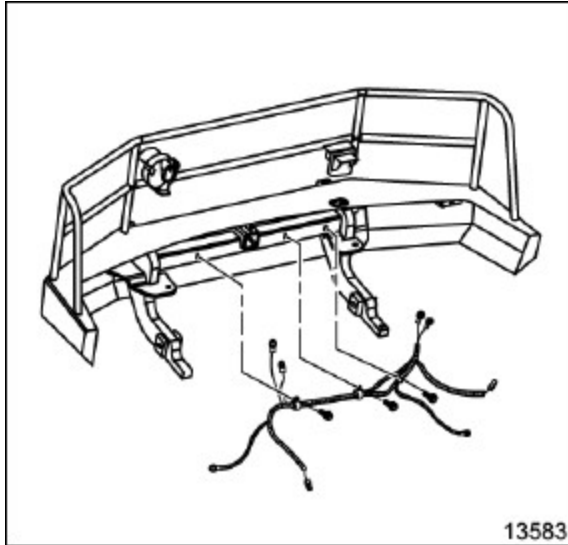
The winter front cover covers the grille area and is designed to increase interior heating during temperatures above 0°C, (32°F). The cover must be removed to prevent engine over heating.

Bumpers

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Battery Cable Connections	17 N•m	13 lb ft
Cable Guide Plate U-Bolt Nuts	15-18 N•m	11-13 lb ft
Frame Rail Bracket Bolts/Nuts	117 N•m	87 lb ft
Front Bumper Centre Bolts	122 N•m	90 lb ft
Front Bumper Lower Support Bolts	77 N•m	57 lb ft
Front Bumper Upper Support Bolts	31 N•m	23 lb ft
Front Clevis Bolts	200 N•m	148 lb ft
License Plate Bracket Bolt-Front	132 N•m	98 lb ft
Lighting Bracket Bolts/Nuts	28 N•m	21 lb ft
Pintle Hook Bracket Bolts (Cable Layer)	110-130 N•m	81-96 lb ft
Pintle Hook Retaining Nut (Cable Layer)	29 N•m	22 lb ft
Rear Bumper Reinforcement to Bumper Bolts	79 N•m	59 lb ft
Rear Bumper Reinforcement to Frame Bolts	117 N•m	87 lb ft
Rear Bumper Side Frame Bolts	117 N•m	87 lb ft
Rear Bumper Side Reinforcement Bolts	79 N•m	59 lb ft
Rear Clevis Bolts	200 N•m	148 lb ft
Safety Chain Eye Bolt Nuts (Cable Layer)	240 N•m	177 lb ft
Slave Receptacle Mounting Bolts	7-9 N•m	5-7 lb ft
Slave Start Harness Connections	6 N•m	4.1 lb ft



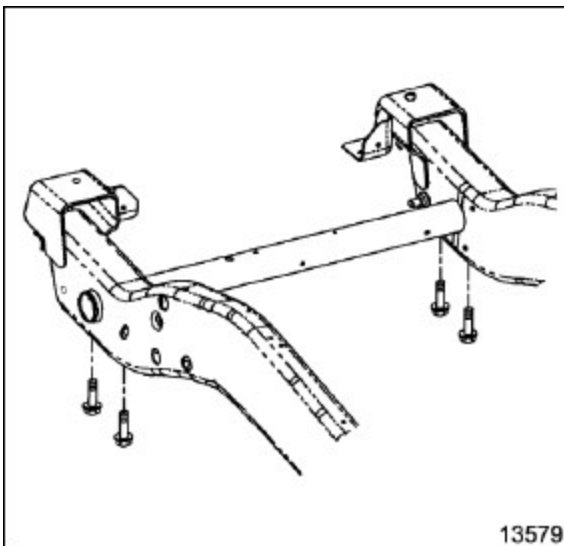
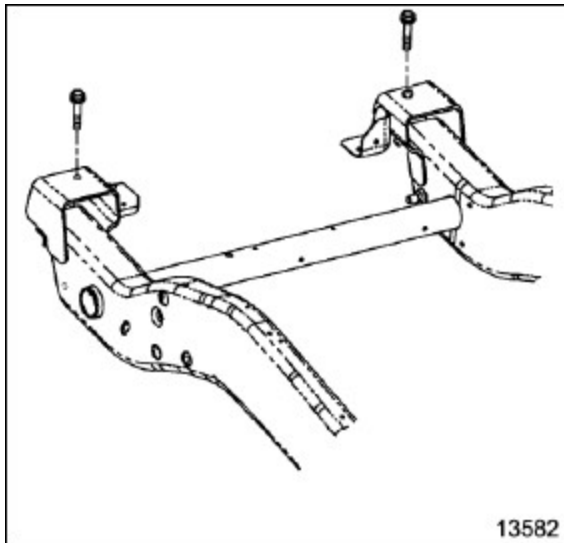
Repair Instructions

Bumper Replacement - Front

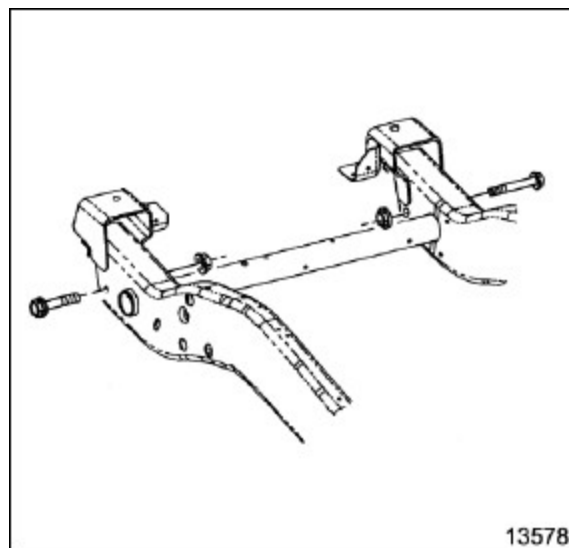
Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

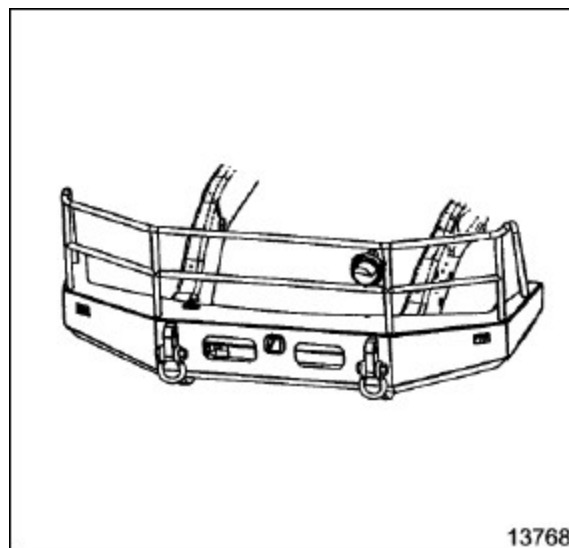
1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the blackout (B/O) headlamp. Refer to Headlamp Replacement Blackout (B/O) in Lighting Systems.
3. Remove the slave receptacle. Refer to Slave Receptacle Replacement.
4. Remove the blackout (B/O) marker lamp. Refer to Marker Lamp Replacement – Front Blackout (B/O) in Lighting Systems.
5. Remove the 3 bolts and the 3 clamps securing the slave receptacle harness and the blackout (B/O) harness from the bumper assembly.
6. Support the bumper assembly using an approved support system.
7. Remove the 2 bolts from the upper bumper supports.
8. Remove the 4 bolts from the lower supports.



9. Remove the 2 bolts and the 2 nuts from the centre bumper supports.

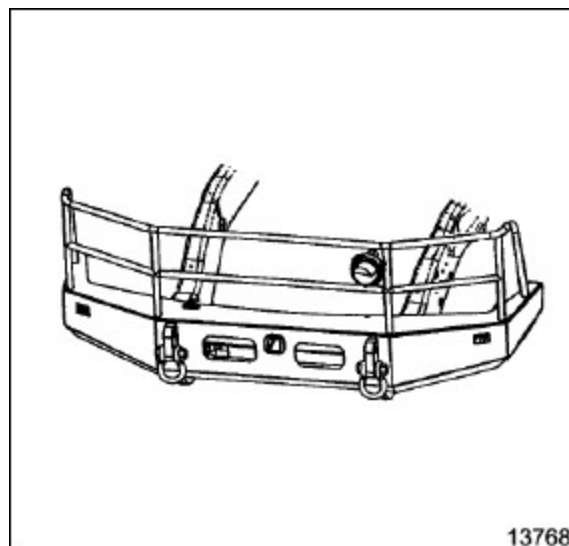


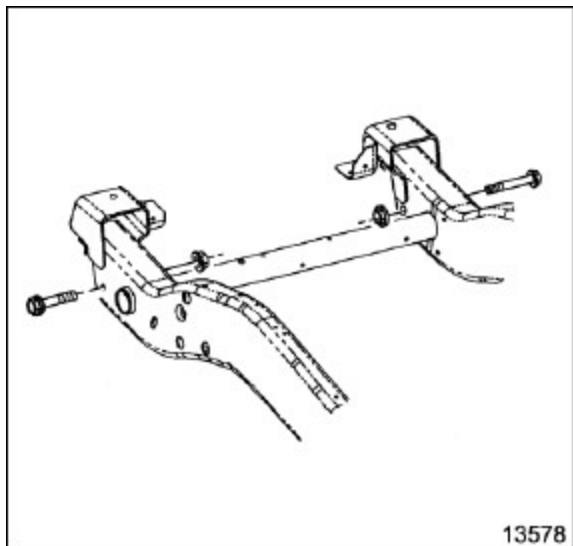
10. Using the aid of an assistant, remove the bumper assembly from the vehicle.
11. Remove the clevis/tie-downs. Refer to Clevis/Tie-Down Replacement-Front.
12. Remove the crooks stick support. Refer to Cable Guide Support Replacement.



Installation Procedure

1. Install the cable guide support. Refer to Cable Guide Support Replacement.
2. Install the clevis/tie-downs onto the bumper. Refer to Clevis/Tie-Down Replacement - Front.
3. Support the bumper assembly by using an approved support system.
4. Using the aid of an assistant, position the bumper assembly onto the vehicle.



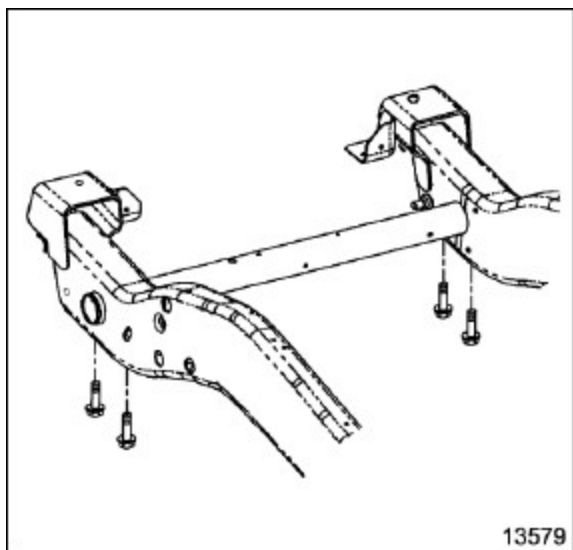


Notice: Refer to Fastener Notice in Cautions and Notices.

5. Install the 2 bolts and 2 nuts onto the centre bumper supports.

Tighten

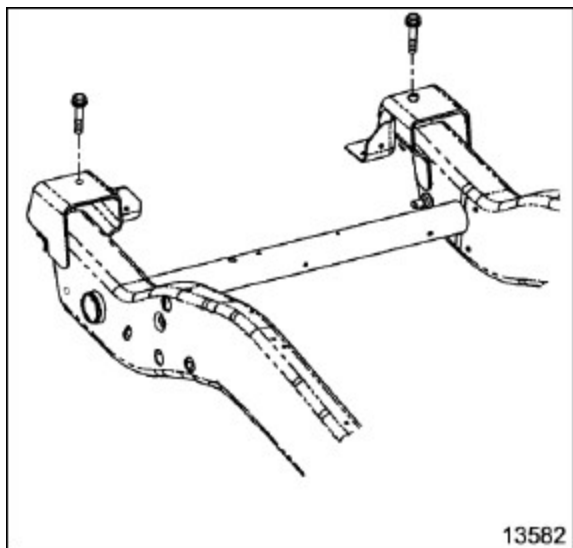
Tighten the centre bumper support bolts to 122 N•m (90 lb ft).



6. Install the 4 bolts onto the lower bumper supports.

Tighten

Tighten the lower bumper support bolts to 77 N•m (57 lb ft).

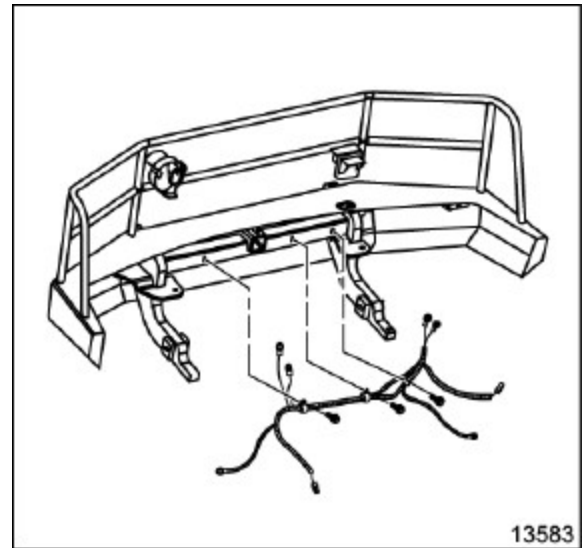


7. Install the 2 bolts onto the upper bumper supports.

Tighten

Tighten the upper bumper support bolts to 31 N•m (23 lb ft).

8. Install the 3 bolts and the 3 clamps onto the blackout (B/O) harness, the slave receptacle and the bumper assembly.
9. Install the blackout (B/O) marker lamps onto the bumper. Refer to Marker Lamp Replacement - Front Blackout (B/O) in Lighting Systems.
10. Install the slave receptacle onto the bumper. Refer to Slave Receptacle Replacement.
11. Install the blackout (B/O) headlamp onto the bumper. Refer to Headlamp Replacement - Blackout (B/O) in Lighting Systems.
12. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
13. Install the crooks stick support. Refer to Cable Guide Support Replacement.

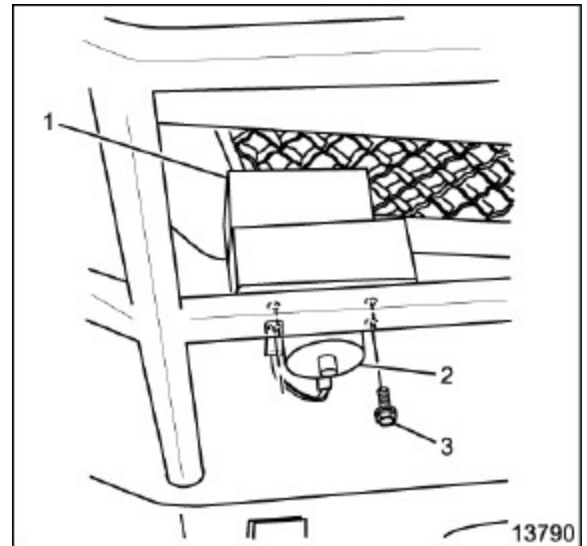


Slave Receptacle Replacement

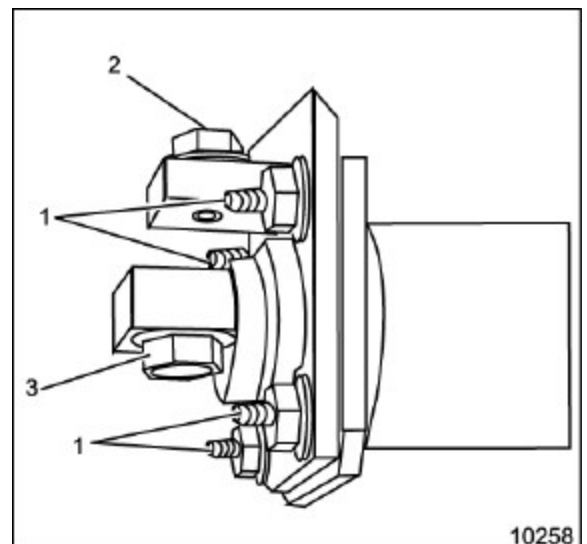
Removal Procedure

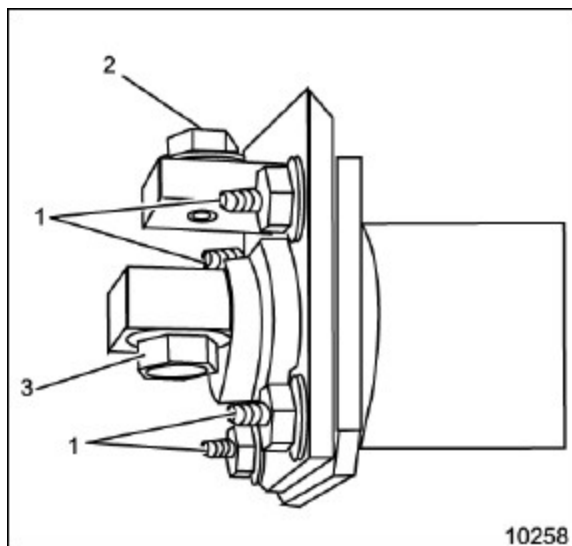
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the 4 bolts (3) securing the slave receptacle to the slave receptacle cover (2) and connect the bracket (1).
3. Remove the slave receptacle cover (2).



4. Disconnect the negative cable connections (2).
5. Remove the rubber cover from the rear of the positive cable connection.
6. Disconnect the positive cable connection (3).
7. Remove the slave receptacle and the gasket from the bracket.





Installation Procedure

Notice: The gasket must mount to the square back of the slave start connector assembly.

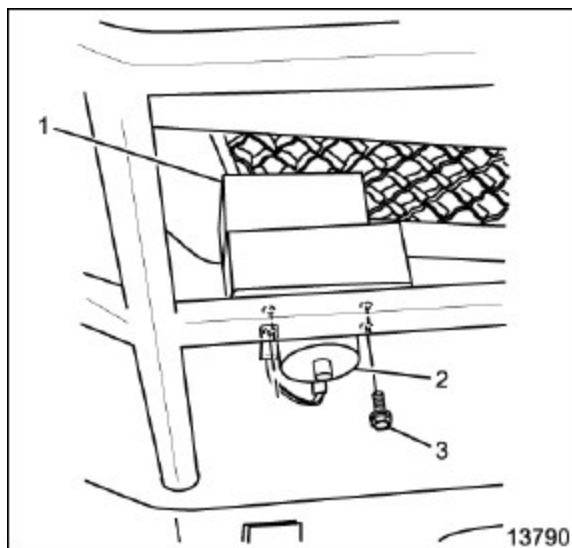
1. Position the slave receptacle with the gasket onto the bracket.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the positive cable onto the connection (3).
3. Install the negative cable onto the connection (2).

Tighten

- Tighten positive connections to 6 N•m (4.1 lb ft).
- Tighten negative connections to 6 N•m (4.1 lb ft).

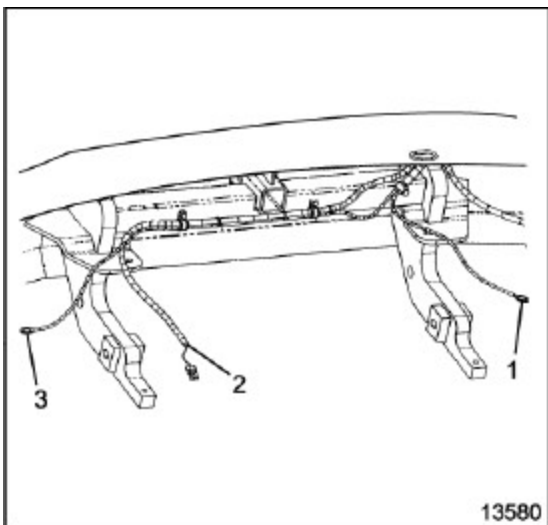


4. Install the rubber cover onto the rear of the positive cable connection.
5. Position the slave receptacle cover onto the rear of the bracket.
6. Install the 4 bolts (3) onto the slave receptacle (2) and the slave receptacle rear connector cover (1).

Tighten

Tighten bolts to 7-9 N•m (5-7 lb ft).

7. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.



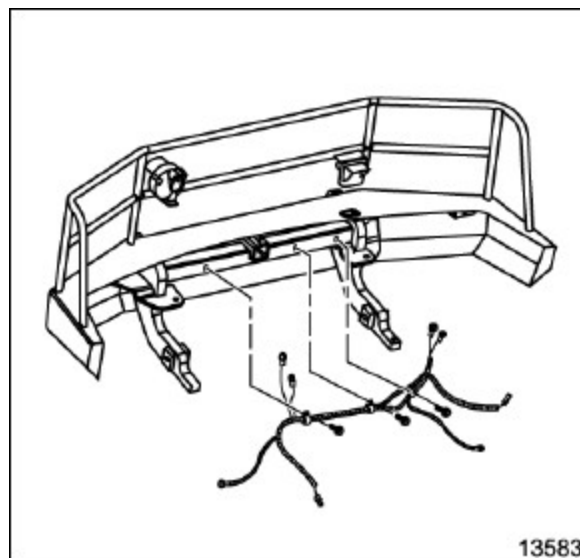
Slave Receptacle Harness Replacement

Removal Procedure

Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

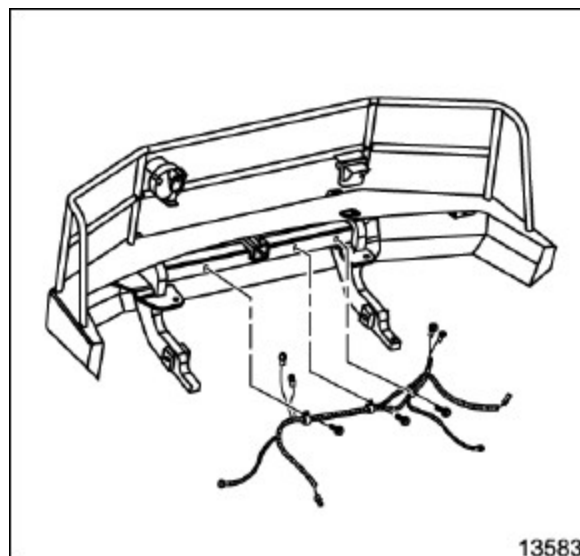
1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Trace the negative slave receptacle cable (1) to the cable ground connection.
3. Disconnect the negative slave receptacle ground cable from the ground connection.
4. Trace the positive slave receptacle cable (3) to the 24V battery connection.
5. Disconnect the positive slave receptacle cable (3) to the 24V battery connection.

6. Disconnect the slave receptacle connectors from the slave receptacle. Refer to Receptacle Connector Replacement.
7. Remove the 3 bolts from the clamps securing the slave receptacle harness and the blackout (B/O) harness.
8. Remove the slave receptacle harness from the bumper assembly.

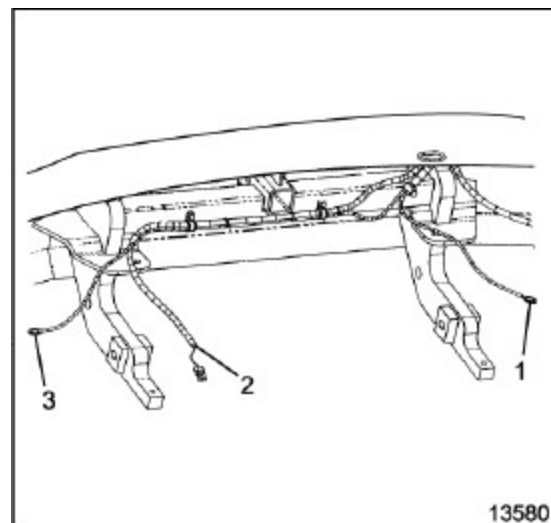


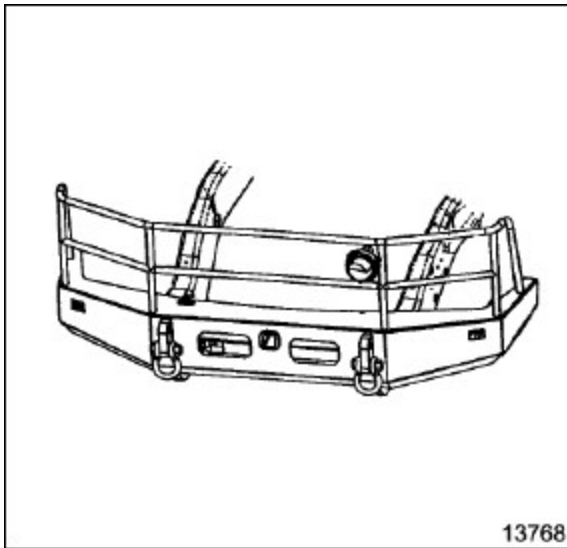
Installation Procedure

1. Position the slave receptacle harness onto the bumper assembly.
2. Install the 3 clamps and the 3 bolts onto the slave receptacle harness and the blackout (B/O) harness.
3. Connect the slave receptacle connectors to the slave receptacle. Refer to Slave Receptacle Replacement.
4. Install the positive slave receptacle cable in the same routing location as removed.



5. Connect the positive slave receptacle cable connector (3) to the 24V battery connection.
6. Install the negative slave receptacle cable in the same routing location as removed.
7. Connect the negative slave receptacle connector (1) to the cable ground connection.
8. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

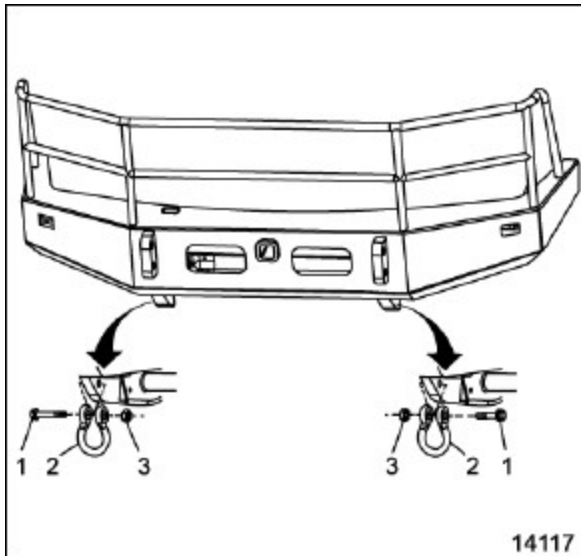




13768

Radiator Grille Brush Guard Replacement

Note: The grille brush guard and front bumper are replaced as a unit. If damaged refer to Bumper Replacement - Front.

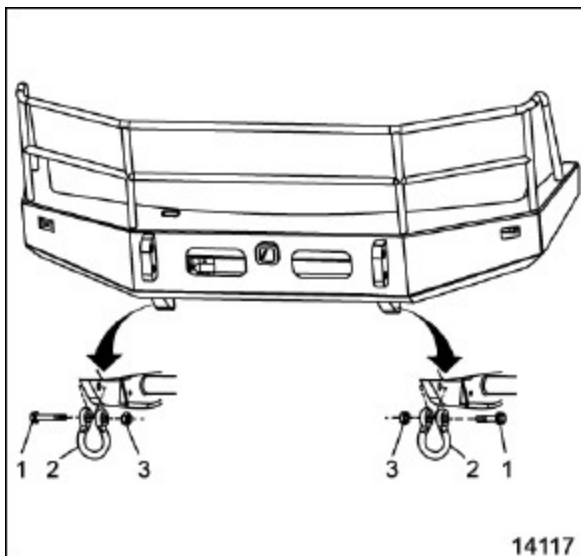


14117

Clevis/Tie-Down Replacement – Front

Removal Procedure

1. Remove nut (3) and bolt (1).
2. Remove clevis (2) from mount.



14117

Installation Procedure

1. Install clevis (2) to the mount.

Notice: Refer to Fastener Notice in Cautions and Notices.

Notice: Clevis must move once torqued. Do not over torque.

2. Install bolt (1) and nut (3).

Tighten

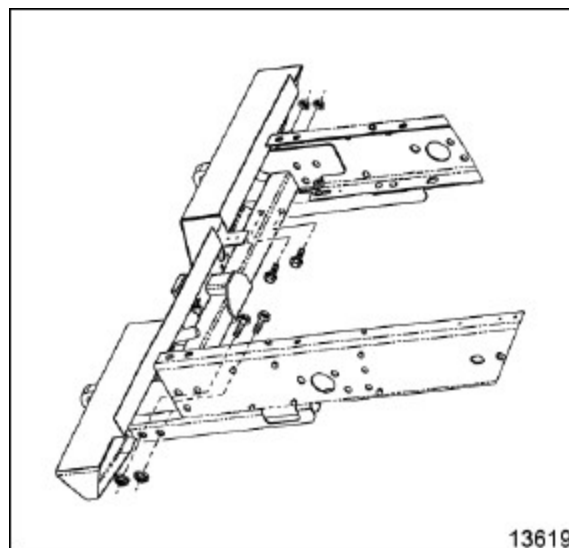
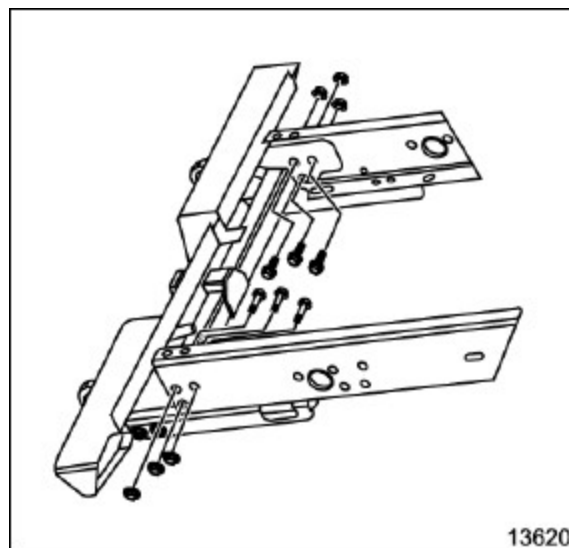
Tighten nut and bolt to 200 N•m (148 lb ft).

Bumper Replacement - Rear

Removal Procedure

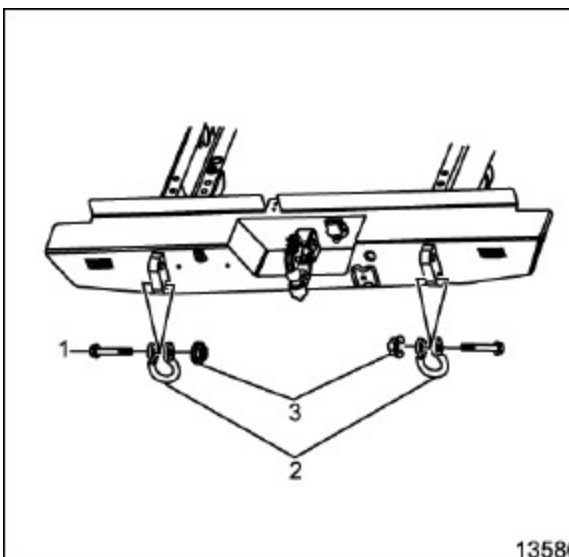
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

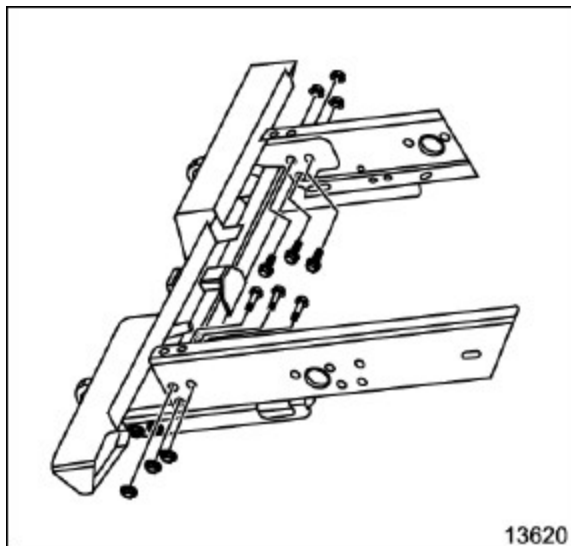
1. Remove the negative battery cable of the right battery and the 12V and 24V cables of the left battery.
2. Remove the pintle hook. Refer to Pintle Hook Replacement.
3. Disconnect the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring Systems.
4. Support the rear bumper using an approved support system.
5. Remove the 6 side frame rail to bracket bolts.
6. Remove the 4 bumper reinforcement bolts.
7. Using the aid of an assistant, remove the rear bumper from the vehicle.
8. Remove the trailer wiring harness from the rear bumper. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring Systems.
9. Remove the blackout (B/O) marker lamps. Refer to Marker Lamp Replacement - Rear in Lighting Systems.
10. Remove the military trailer connector. Refer to Military Trailer Connector Replacement in Lighting Systems.
11. Remove the commercial trailer connector. Refer to Commercial Trailer Connector Replacement in Wiring Systems.
12. Remove the clevis/tie-down. Refer to Clevis/Tie-Down Replacement - Rear.



Installation Procedure

1. Install the clevis/tie-down (2). Refer to Clevis/Tie-Down Replacement - Rear.
2. Install the blackout (B/O) marker lamps. Refer to Marker Lamp Replacement - Rear in Lighting Systems.
3. Install the military trailer connector. Refer to Military Trailer Connector Replacement in Lighting Systems.
4. Install the commercial trailer connector. Refer to Commercial Trailer Connector Replacement in Wiring Systems.
5. Install the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring Systems.
6. Support the rear bumper using an approved support system.
7. Using the aid of an assistant, position the rear bumper onto the vehicle.

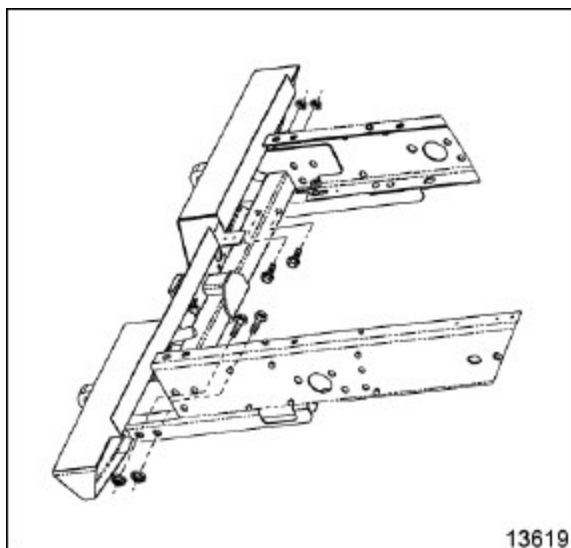




Notice: Refer to Fastener Notice in Cautions and Notices.

8. Install the 6 side frame rail to bracket bolts/nuts.

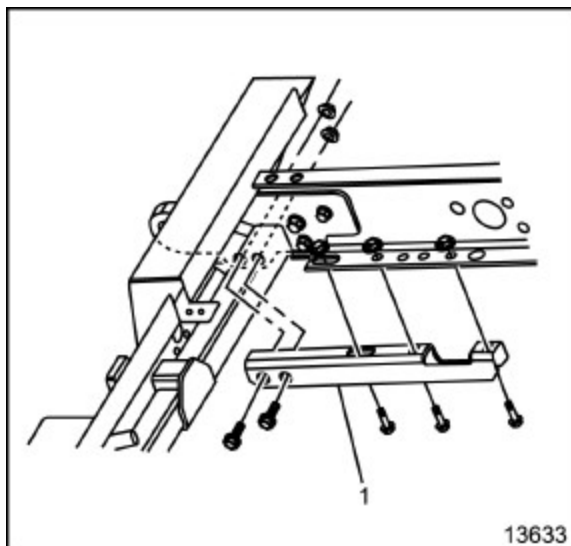
Note: Do not tighten at this time.



9. Install the 4 bumper reinforcement bolts.

Important: Tighten the rear bumper mounting bolts in the following sequence.

- Tighten the 6 side frame rail bracket bolts/nuts to 117 N•m (87 lb ft).
 - Tighten the 4 side bumper reinforcement bracket bolts/nuts to 79 N•m (59 lb ft).
10. Connect the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring System.
 11. Remove the support.
 12. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
 13. Install the pintle hook. Refer to Pintle Hook Replacement.



Bumper Reinforcement - Rear

Removal Procedure

1. Remove the 2 rear bumper bracket nuts/bolts.
2. Remove the 3 rear bumper reinforcement to frame nuts/bolts.
3. Remove the rear bumper reinforcement bracket (1).

Installation Procedure

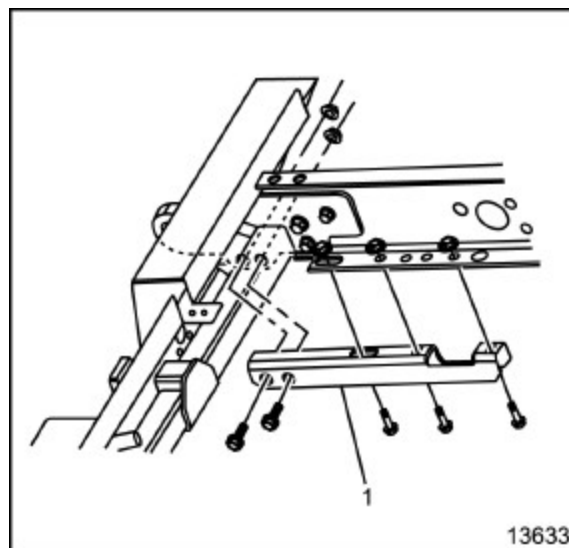
1. Position the rear bumper reinforcement bracket (1) onto the vehicle.
2. Install the 2 bumper reinforcement to bracket nuts/bolts.

Note: Do not tighten at this time.

3. Remove the 3 bumper reinforcement to frame nuts/bolts.

Important: Tighten the rear bumper reinforcement in the following sequence.

- Tighten the 3 bumper reinforcement to frame nuts/bolts to 117 N•m (87 lb ft).
- Tighten the 2 side bumper reinforcement bracket bolts/nuts to 79 N•m (59 lb ft). Repeat for opposite side.

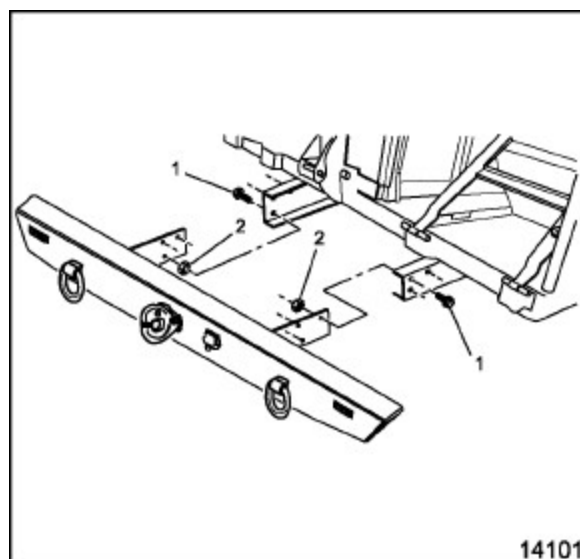
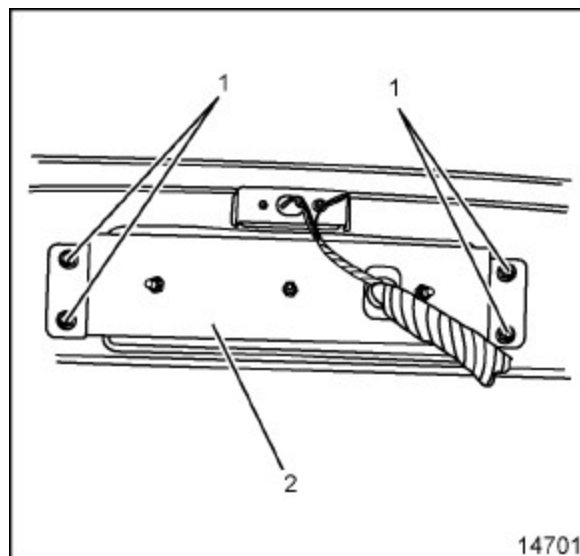


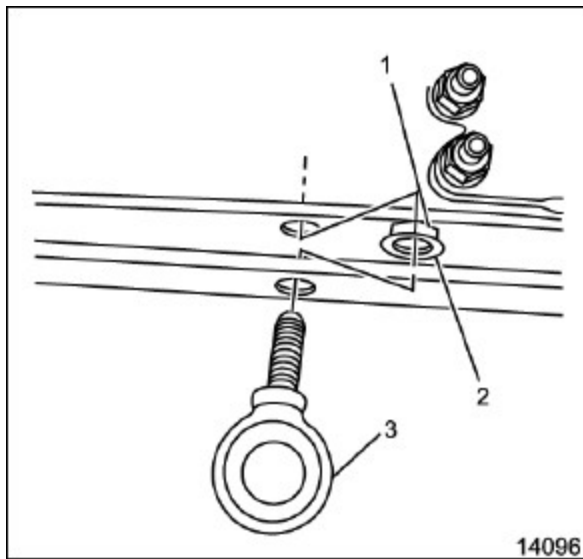
Bumper Replacement – Rear (Cable Layer)

Removal Procedure

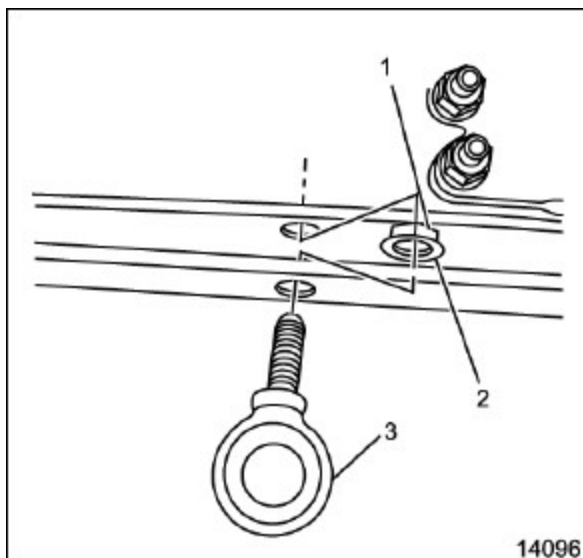
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the pintle hook. Refer to Pintle Hook Replacement – Rear (Cable Layer).
3. Disconnect the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring Systems.
4. Remove the blackout (B/O) marker lamps. Refer to Marker Lamp Replacement - Rear in Lighting Systems.
5. Remove the 4 nuts (1), 4 washers and the 4 bolts from the lighting bracket (2).
6. Remove the lighting bracket (1) from the bumper (2). Repeat procedure for opposite side.
7. Support the rear bumper using an approved support system.
8. Remove the 6 side frame rail to bracket bolts (1) and the 6 nuts (2).
9. Using the aid of an assistant, remove the rear bumper from the vehicle.
10. Remove the trailer wiring harness from the rear bumper. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring in Wiring Systems.
11. Remove the military trailer connector. Refer to Military Trailer Connector Replacement in Wiring Systems.
12. Remove the commercial trailer connector. Refer to Commercial Trailer Connector Replacement in Wiring Systems.



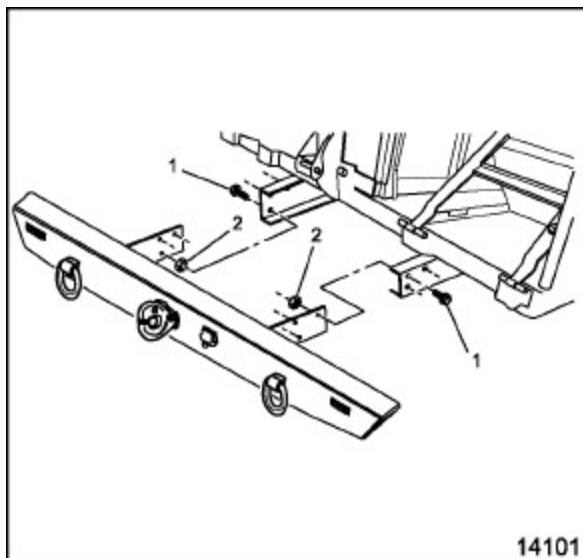


13. Remove the 2 safety chain eyebolts (3). Refer to Safety Chain Eyebolt Replacement (Cable Layer).
14. Remove the license plate lamp from the bumper.



Installation Procedure

1. Install the license plate lamp onto the bumper.
2. Install the two safety chain eyebolts (3). Refer to Safety Chain Eyebolt Replacement (Cable Layer).
3. Install the commercial trailer connector. Refer to Commercial Trailer Connector Replacement in Wiring Systems.
4. Install the military trailer connector. Refer to Military Trailer Connector Replacement in Lighting Systems.
5. Install the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring.
6. Support the rear bumper using an approved support system.
7. Using the aid of an assistant, position the rear bumper onto the vehicle.



Notice: Refer to Fastener Notice in Cautions and Notices.

8. Install the 6 side frame rail to bracket bolts/nut (1).
Tighten
 Tighten the 6 frame rail bracket bolts/nuts to 117 N•m (87 lb ft).
9. Remove the support from the bumper.
10. Position the lighting bracket onto the bumper.
11. Install the blackout (B/O) marker lamps. Refer to Marker Lamp Replacement – Rear in Lighting Systems.

12. Install the 4 lighting bracket bolts (1), 4 washers and the 4 nuts.

Tighten

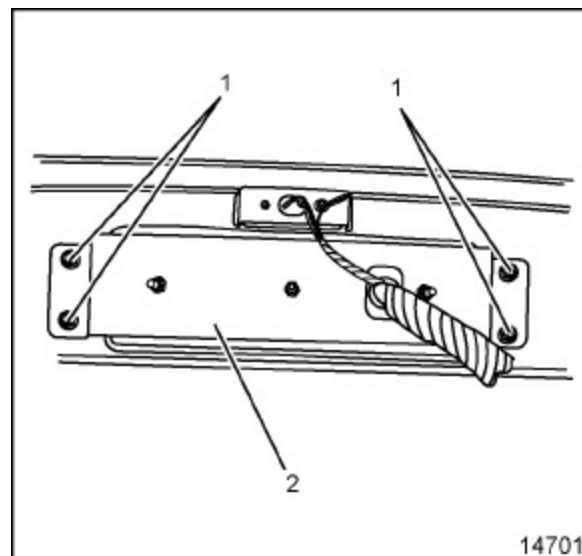
Tighten the lighting bracket bolts/nuts to 28 N•m (21 lb ft).

Repeat procedure for the opposite side.

13. Connect the trailer wiring harness. Refer to Blackout (B/O) and Trailer Harness Replacement - Rear in Wiring Systems.
14. Install the pintle hook. Refer to Pintle Hook Replacement (Cable Layer).
15. Connect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.

Tighten

Tighten the battery cable connections to 17 N•m (13 lb ft).

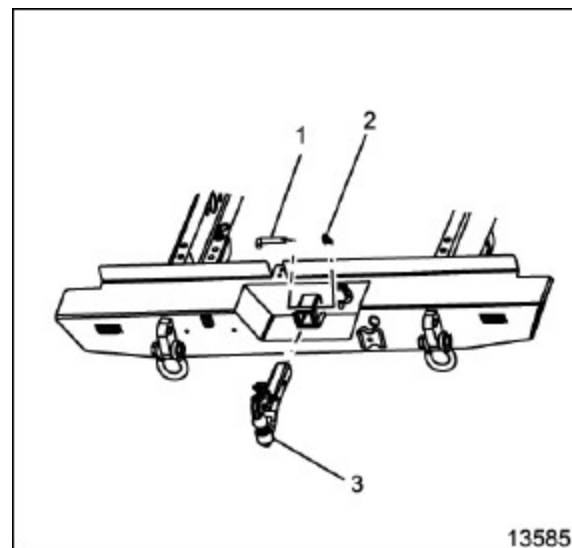


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Pintle Hook Replacement

Removal Procedure

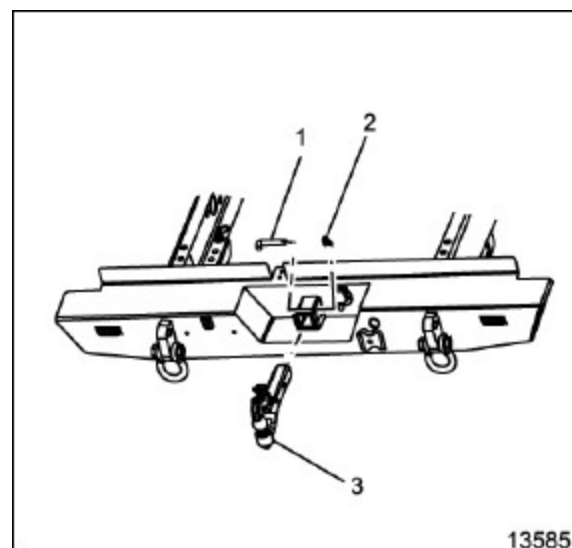
1. Remove the spring clip (2) from the retaining pin.
2. Remove the retaining pin (1) from the receiver.
3. Pull the pintle hook (3) out of the receiver.



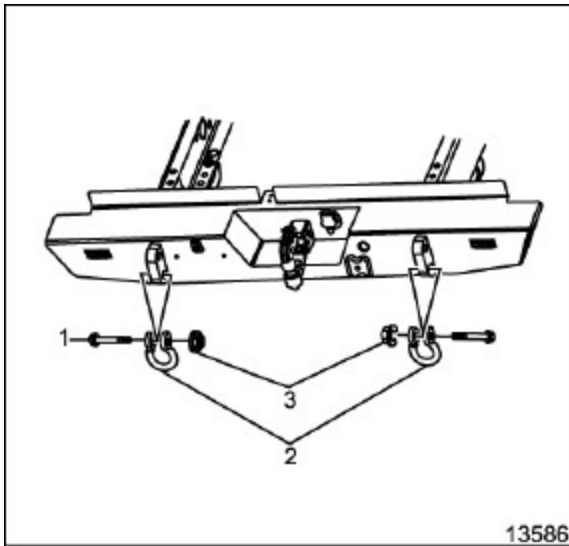
13585

Installation Procedure

1. Clean any debris out of the receiver.
2. Push pintle hook (3) into receiver until holes line up.
3. Install retaining pin (1) into hole.
4. Install spring clip (2) into retaining pin.



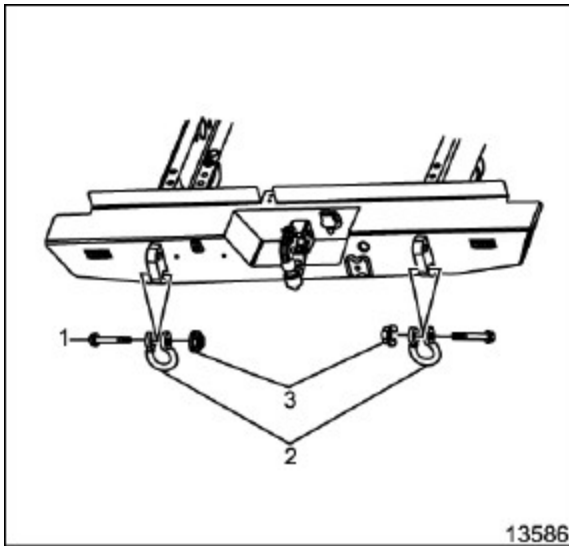
13585



Clevis/Tie-Down Replacement – Rear

Removal Procedure

1. Remove nut (3) and bolt (1).
2. Remove clevis (2) from frame.



Installation Procedure

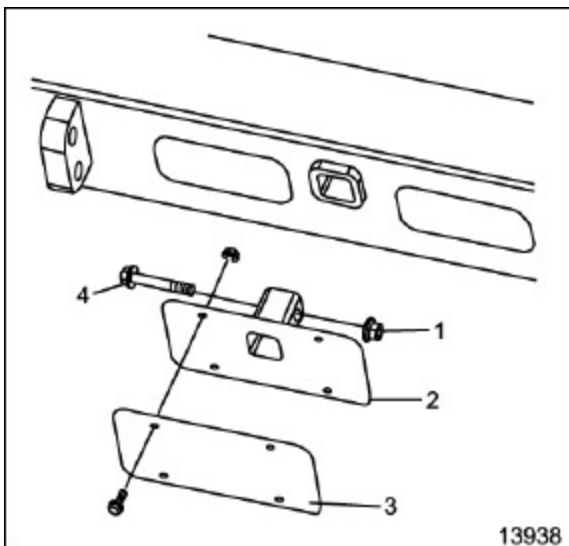
1. Install clevis (2) to frame.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install bolt (1) and nut (3).

Notice: Clevis must move once torqued. Do not over torque.

3. **Tighten**
Tighten nut and bolt to 200 N•m (148 lb ft).



License Plate Bracket Replacement

Removal Procedure

1. Remove the vehicle license plate (3) from the bracket.
2. Remove the nut (1) and bolt (4) from the bumper receiver.
3. Slide the bracket (2) out of the receiver.

Installation Procedure

1. Clean any debris out of the bumper receiver opening.
2. Slide the bracket (2) into the bumper receiver and align hole.

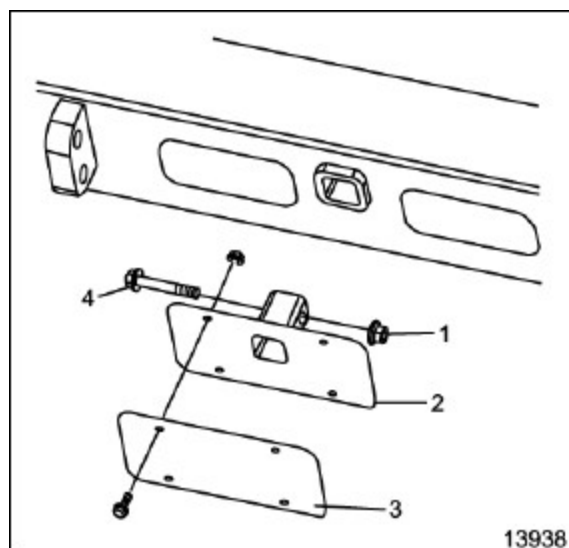
Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the bolt (4) and nut (1).

Tighten

Tighten the nut and bolt to 132 N•m (98 lb ft).

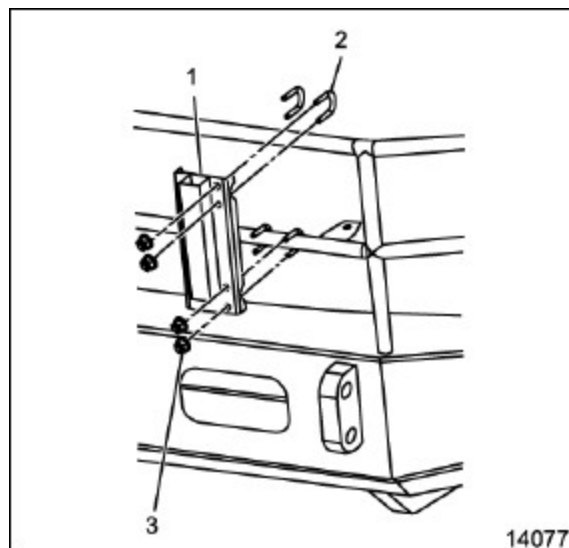
4. Install the vehicle license plate (3).



Cable Guide Support Replacement

Removal Procedure

1. Mark the location of the support to the bumper.
2. Remove the 8 U-bolts nuts (3).
3. Remove the 4 U-bolts (2).
4. Remove the support (1) from the bumper.



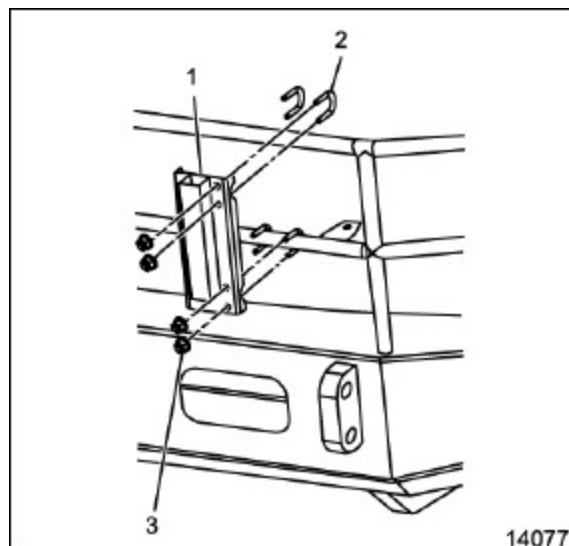
Installation Procedure

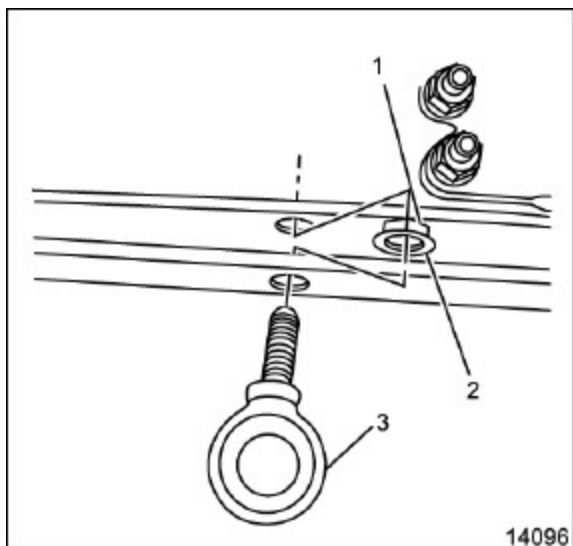
1. Install the support (1) onto the bumper lining up to the marks made during removal.
2. Install the 4 U-bolts (2).
3. Install the 8 U-bolt nuts (3).
4. Verify the correct position of the support.

Specification: 292.1mm (11.50 in) from the centre line of the bumper and tighten nuts.

Tighten

Tighten U-bolt nuts to 15-18 N•m (11-13 lb ft).

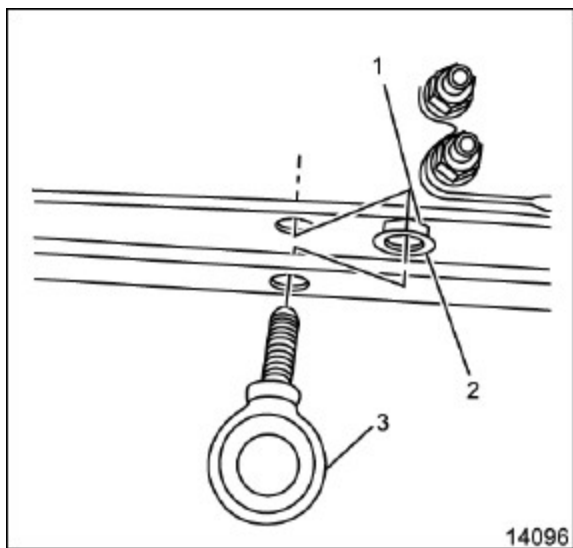




Safety Chain Eyebolt Replacement (Cable Layer)

Removal Procedure

1. Remove the nut (1) and the washer (2) from the safety chain eyebolt (3).
2. Remove the safety chain eyebolt (3) from the bumper.



Installation Procedure

Note: Eyebolt must be parallel with the bumper.

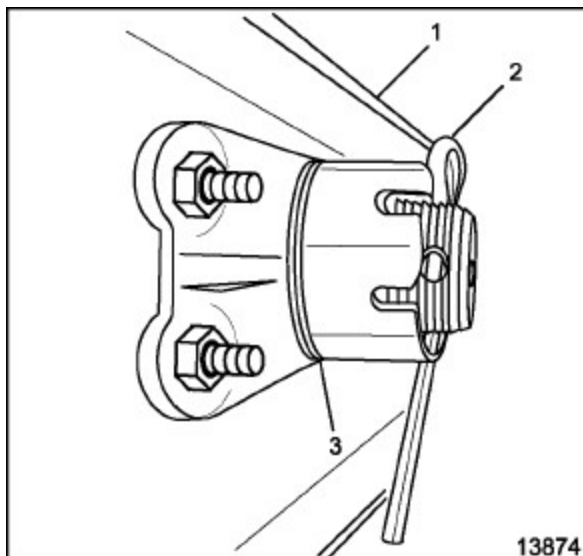
1. Position the safety chain eyebolt (3) onto the bumper.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the washer (2) and the nut (1) onto the safety chain eyebolt (3).

Tighten

Tighten the nut 240 N•m (177 lb ft).

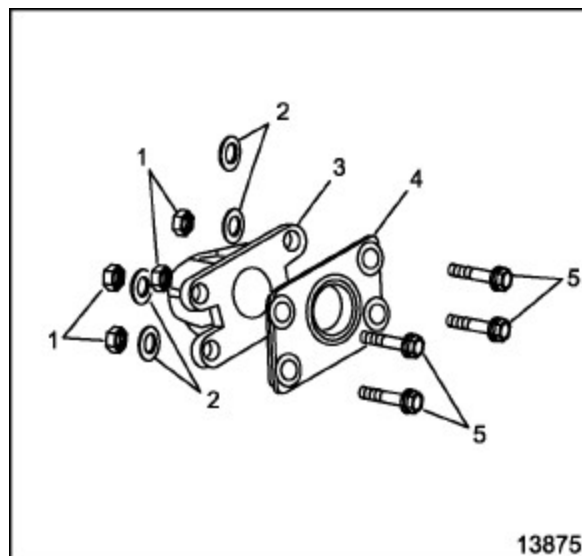


Pintle Hook Replacement – Rear (Cable Layer)

Removal Procedure

1. Remove the cotter pin (2) from the pintle hook.
2. Remove the nut and the washer (3) from the pintle hook.
3. Remove the pintle hook from the bumper (1).

4. Remove the 4 nuts (1), 4 washers (2) and the 4 bolts (5) from the pintle hook mounting brackets (3, 4).
5. Remove the front pintle hook mounting bracket (4) from the bumper.
6. Remove the rear pintle hook mounting bracket (3) from the bumper.

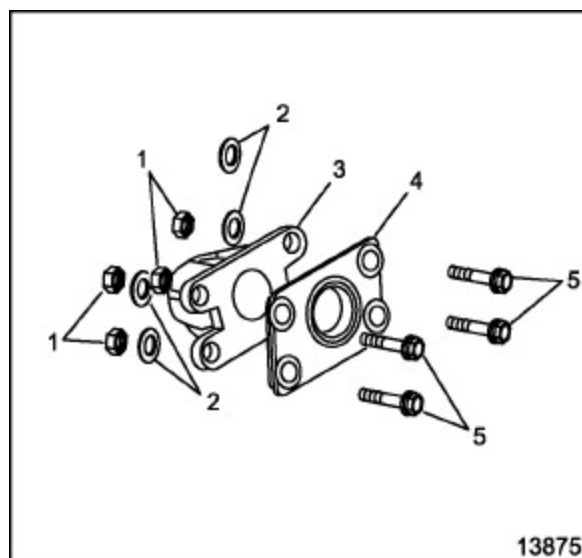


Installation Procedure

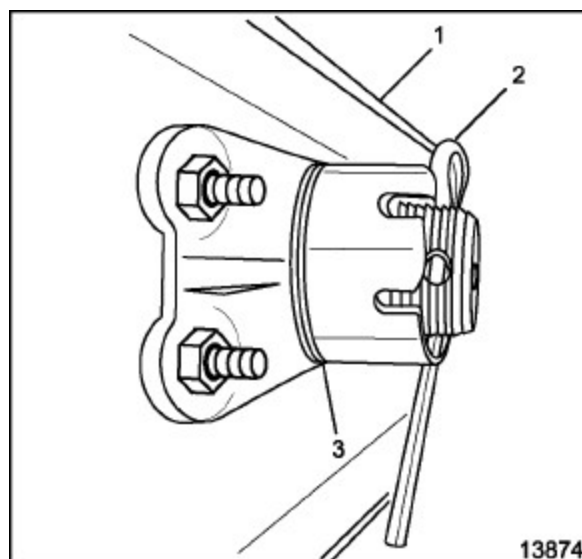
1. Position the rear pintle hook mounting bracket (3) onto the bumper mounting holes.
2. Position the front pintle hook mounting bracket (4) onto the bumper mounting holes.

Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the 4 bolts (5), 4 washers (2), and the 4 nuts (1).
Tighten
 Tighten the bolts to 110-130 N•m (81-96 lb ft).



4. Install the pintle hook onto the bumper.
5. Install the washer (3) and the nut onto the pintle hook.
Tighten
 Tighten the nut to 29 N•m (22 lb ft).
 Back the nut off as needed to align the cotter pin hole.
6. Install the cotter pin (2) onto the pintle hook.



Description and Operation

Bumpers

The equipment described includes all bumper assemblies' front and rear that are offered for the military vehicles. The bumper components provided in this military package are rugged and durable and are designed for the rigors of limited off-road conditions. Repairs on these items include the clevis tie-down's and pintle hooks. The repair of some sub-assemblies requires removal of the rear bumpers for access while others require removal of electrical components and lamp harness connections.

Seats

Specifications

Fastener Tightening Specifications

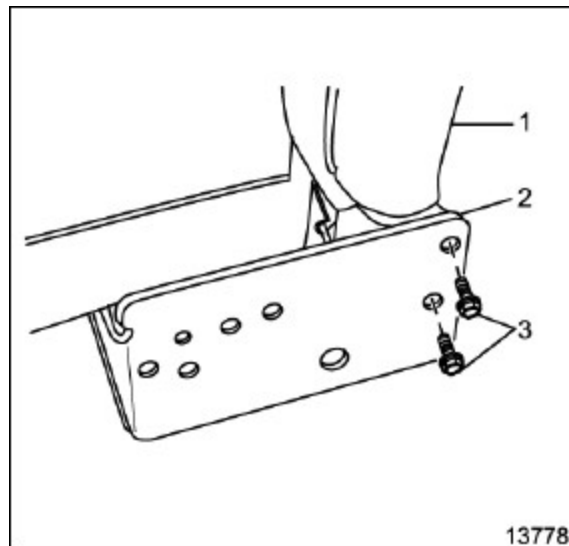
Application	Specification	
	Metric	English
Rear Seat Adapter Mounting Bolt	67-88 N•m	50-65 lb ft
Rear Seat Adapter to Radio Bracket Bolts	19-28 N•m	14-20 lb ft
Rear Seat Adapter to Storage Bracket Bolt	19-28 N•m	14-20 lb ft
Seat Back Bolts	34 N•m	25 lb ft
Seat Bottom Mounting Bolts	67-88 N•m	50-65 lb ft
Storage Bracket Mounting Bolt	19-28 N•m	14-20 lb ft
Storage Bracket Nut	67-88 N•m	50-65 lb ft
Storage Bracket to Radio Mount Bolt	19-28 N•m	14-20 lb ft

Repair Instructions

Seat Back Replacement – Rear

Removal Procedure

1. Remove the 2 seat back mounting bolts (3) from the rear seat adapter (2).
Repeat procedure for the opposite side.
2. Remove the seat back (1) from the rear seat adapter (2).



Installation Procedure

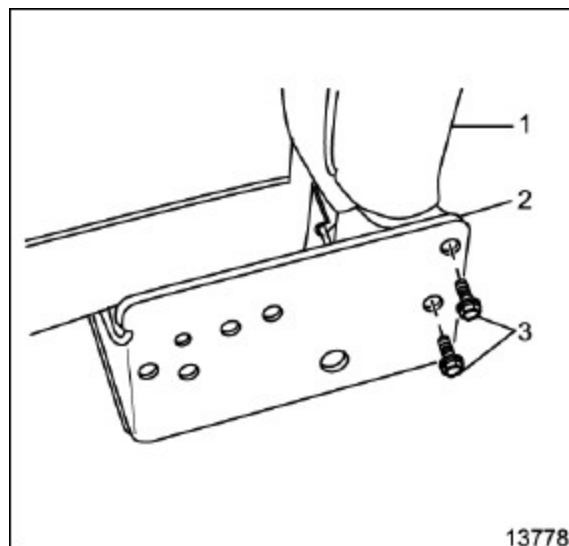
1. Position the seat back (1) onto the rear seat back adapter (2).

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the 2 bolts (3) onto the rear seat adapter (2) and the seat back (1).
Repeat procedure for the opposite side.

Tighten

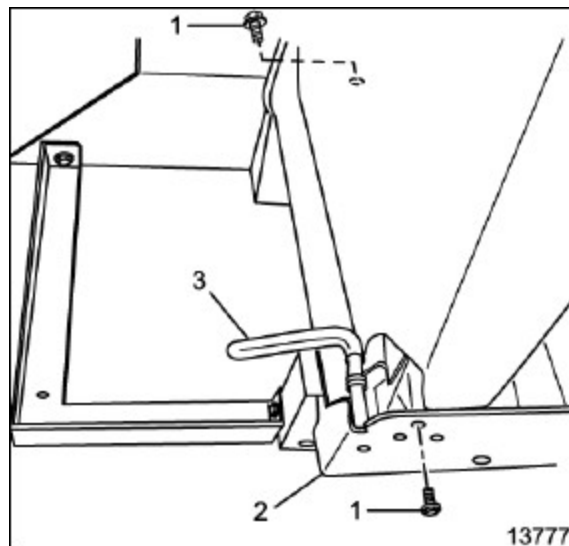
Tighten the seat back mounting bolts to 34 N•m (25 lb ft).

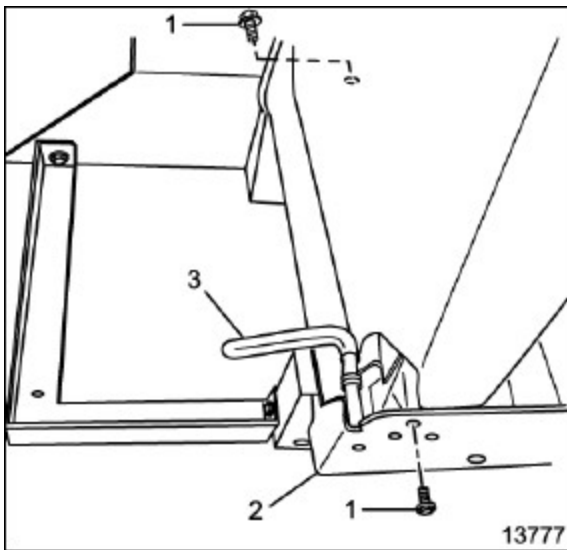


Seat Bottom Replacement – Rear

Removal Procedure

1. Raise the seat into the upward locking position on the rear seat adapter.
2. Remove the 2 bolts (1) from the rear seat adapter and the seat mount.
3. Remove the seat from the rear seat adapter (2).





Installation Procedure

1. Position the seat onto the rear seat adapter (2).

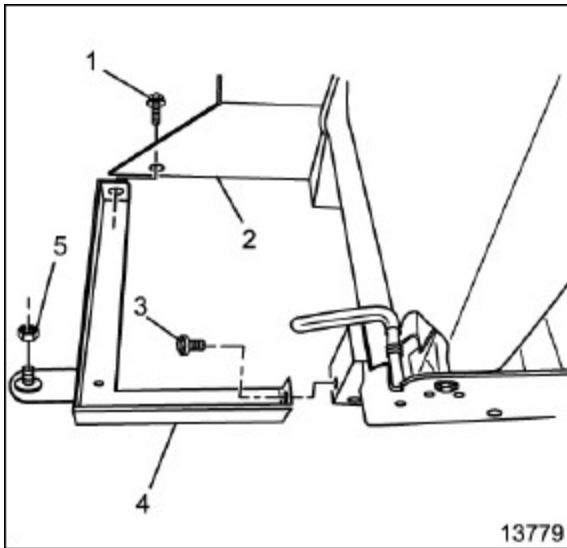
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the 2 bolts (1) onto the rear seat adapter and the seat mount.

Tighten

Tighten the seat mount bolts to 34 N•m (25 lb ft).

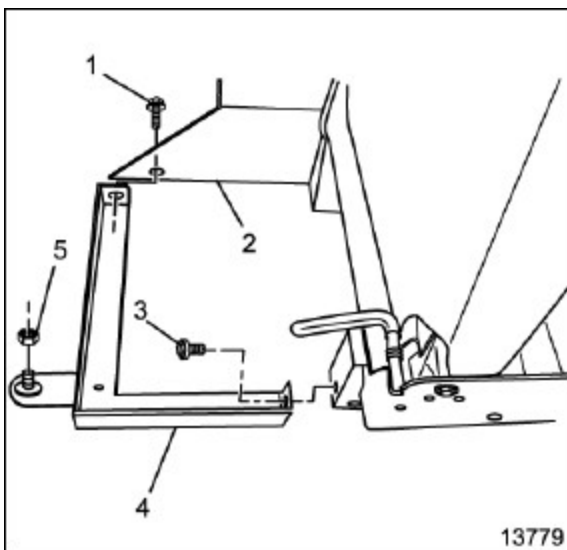
3. Lower the seat into the downward position by releasing the seat latch (3).



Storage Bracket Replacement

Removal Procedure

1. Remove the bolt (1) from the radio cabinet bracket (2) and the storage bracket (4).
2. Remove the bolt (3) from the storage bracket (4) and the rear seat adapter.
3. Remove the nut (5) from the storage bracket mounting stud.
4. Remove the storage bracket from the vehicle.



Installation Procedure

1. Position the storage bracket into the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the nut (5) onto the storage bracket mounting stud.

Tighten

Tighten the storage bracket nut to 67-88 N•m (49-65 lb ft).

3. Install the bolt (3) onto the storage bracket (4) and the rear seat adapter.

Tighten

Tighten the storage bracket to rear seat adapter bolt to 19-28 N•m (14-20 lb ft).

4. Install the bolt (1) onto the radio cabinet bracket (2) and the storage bracket.

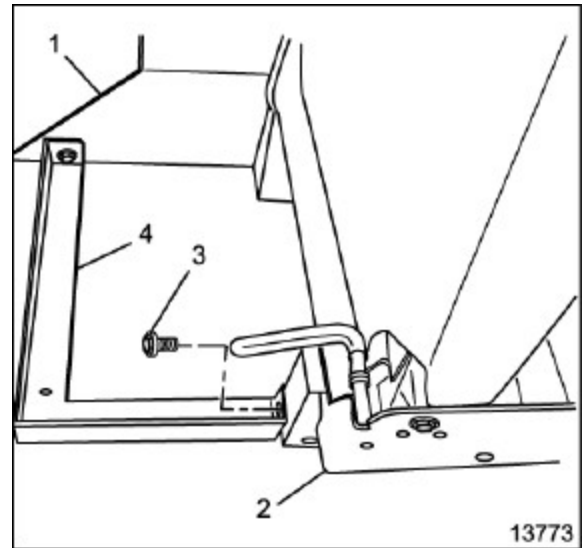
Tighten

Tighten the radio bracket to storage bracket bolt to 19-28 N•m (14-20 lb ft).

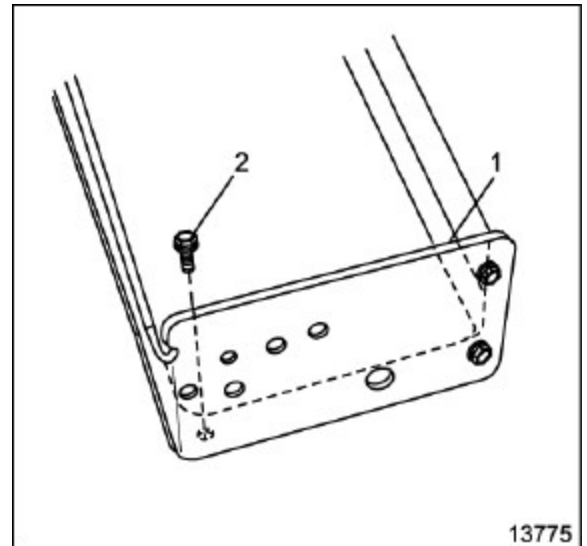
Seat Adapter Bracket Replacement - Rear

Removal Procedure

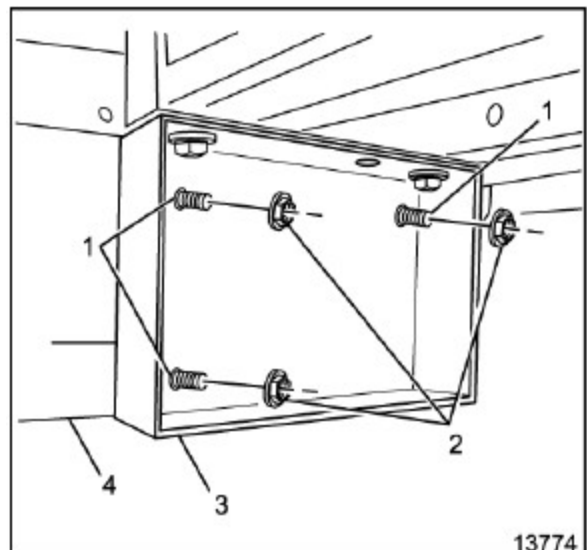
1. Remove the rear seat from the seat adapter. Refer to Seat Bottom Replacement - Rear
2. Remove the seat back from the rear seat adapter. Refer to Seat Back Replacement - Rear.
3. Remove the bolt (3) from the rear seat adapter (2) and the storage bracket (4).

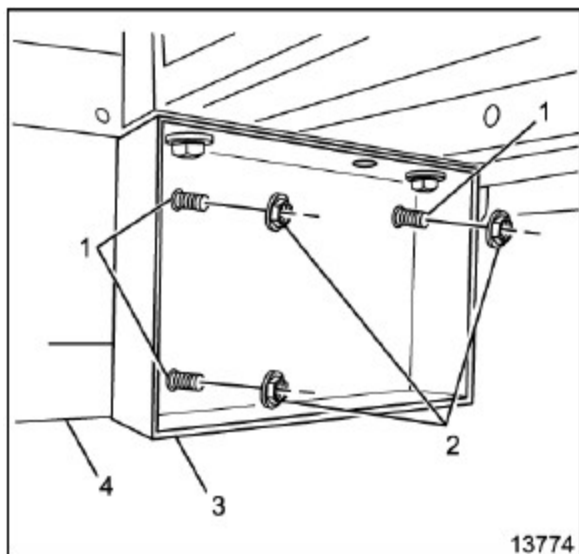


4. Remove the bolt (2) from the rear seat adapter (1) and the floor.



5. Remove the 3 bolts (1) and the nuts (2) from the rear adapter (3) and the radio cabinet bracket (4).
6. Remove the rear seat adapter from the vehicle.





Installation Procedure

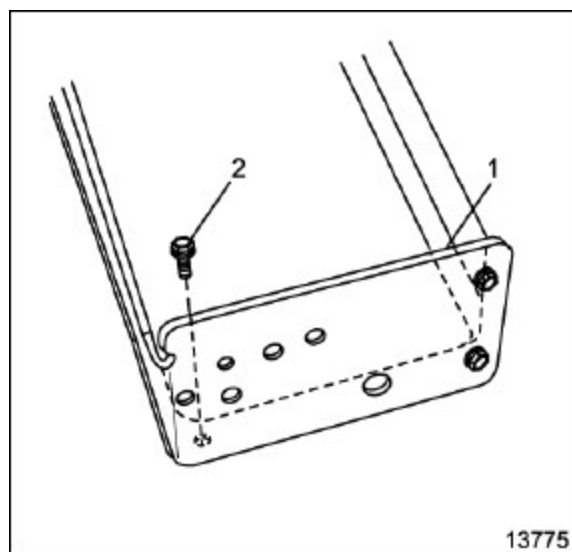
1. Position the rear seat adapter into the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the 3 bolts (1) and the 3 nuts (2) onto the rear seat adapter (3) and the radio cabinet bracket (4).

Tighten

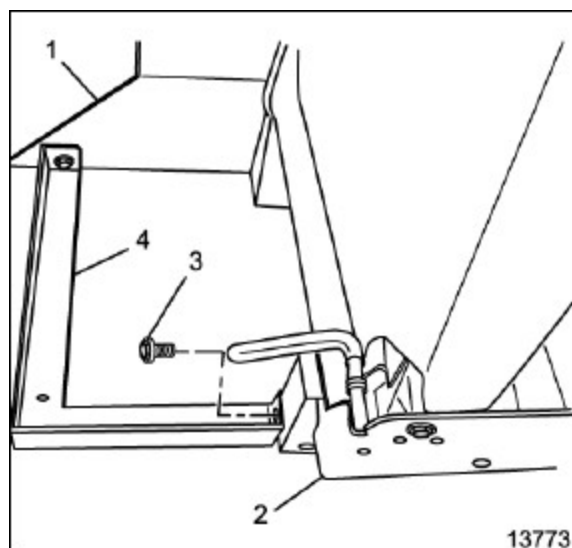
Tighten the rear seat adapter to radio bracket mounting bolts to 67-88 N•m (50-65 lb ft).



3. Install the rear seat adapter mounting bolt (2) to the rear seat adapter (1) and the floor mount.

Tighten

Tighten the rear seat adapter mounting bolt to 34 N•m (25 lb ft).



4. Install the bolt (3) onto the rear seat adapter (2) and the storage bracket (4).

Tighten

Tighten the rear seat adapter to storage bracket bolt to 19-28 N•m (14-20 lb ft).

5. Install the seat back onto the rear seat adapter. Refer to Seat Back Replacement – Rear.
6. Install the seat onto the rear seat adapter. Refer to Seat Bottom Replacement – Rear.

Description and Operation

Folding Rear Seat

The rear seat allows seating for two additional troops. Each seat is anchored to the floor and it's radio adapter bracket with fasteners. The seats can be folded into a locked position by the use of a spring loaded locking pin. Seat belts are provided for security of the troops and should be fastened when occupied.

Seat Covers

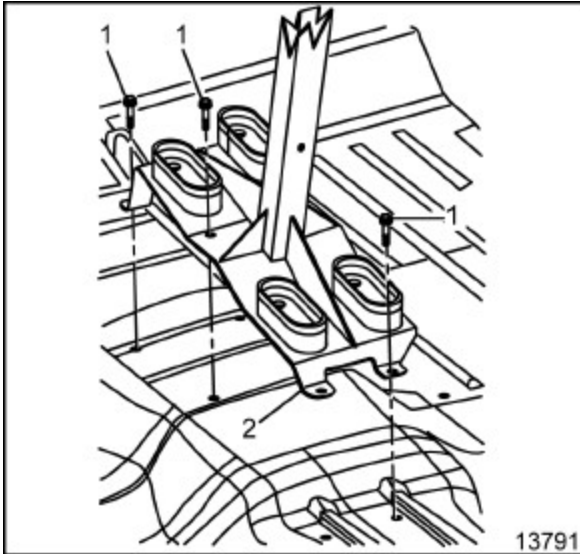
Seat covers are installed on the interior seats to protect the vehicle's interior and are green or tan in colour. They allow full function of the seat controls and seat belts.

Interior Trim

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Accessory Bracket Nuts	67-88 N•m	49-65 lb ft
Battery Cable Connections	17 N•m	13 lb ft
Equalizer Bracket to Vehicle Bolts	6-10 N•m	53-89 lb in
Equalizer Connections	12 N•m	110 lb in
Equalizer Cover Bolts	6-10 N•m	53-89 lb in
Equalizer to Bracket Bolts	6-10 N•m	53-89 lb in
Floor Mount Weapons Bolts	8 N•m	6 lb ft
GPS Front Bolts	19-28 N•m	14-20 lb ft
GPS Rear Bolts	19-28 N•m	14-20 lb ft
Lower Weapons Mount Bolts	19-28 N•m	14-20 lb ft
NAU Bracket Bolts	19-28 N•m	14-20 lb ft
Power Distribution Bolts	8-11 N•m	6-8 lb ft
Radio Base Bracket Nuts	67-88 N•m	49-65 lb ft
Rear Storage Rack Bolts	67-88 N•m	49-65 lb ft

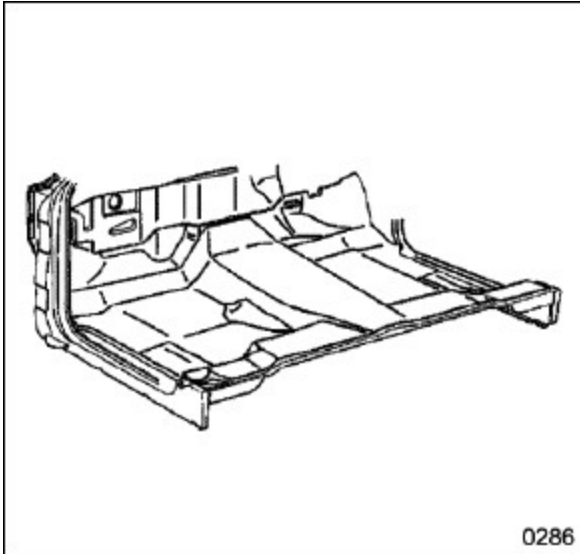


Repair Instructions

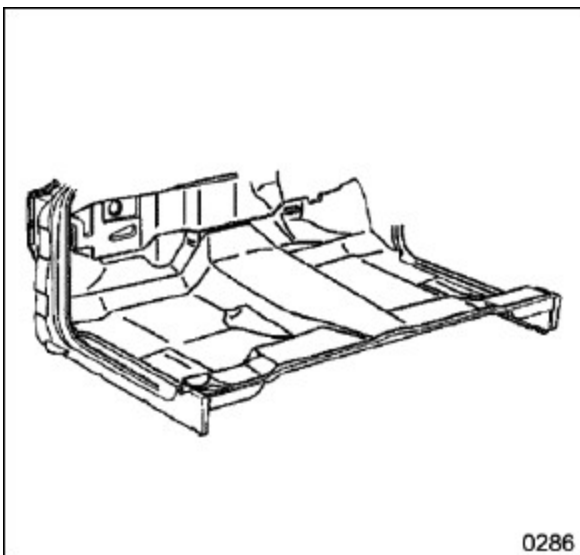
Floor Mat Replacement (Modified)

Removal Procedure

1. Remove the GPS mount. Refer to GPS Mount Replacement.
2. Remove bolts securing weapons mount (2) and remove mount. Refer to Weapons Mount Replacement – Floor Mount.



3. Remove floor mat. Refer to Carpet Replacement – Front in Interior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).



Installation Procedure

1. Using the old floor mat as a template cut weapons mount holes in the new floor mat.
2. Install the floor mat. Refer to Carpet Replacement – Front in Interior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).

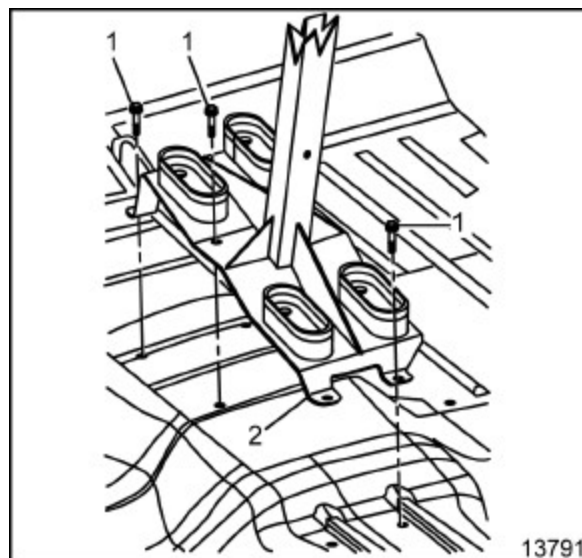
3. Install GPS mount. Refer to GPS Mount Replacement.
4. Install weapons mount (2). Refer to Weapons Mount Replacement – Floor Mount.

Notice: Refer to Fastener Notice in Cautions and Notices.

5. Install bolts.

Tighten

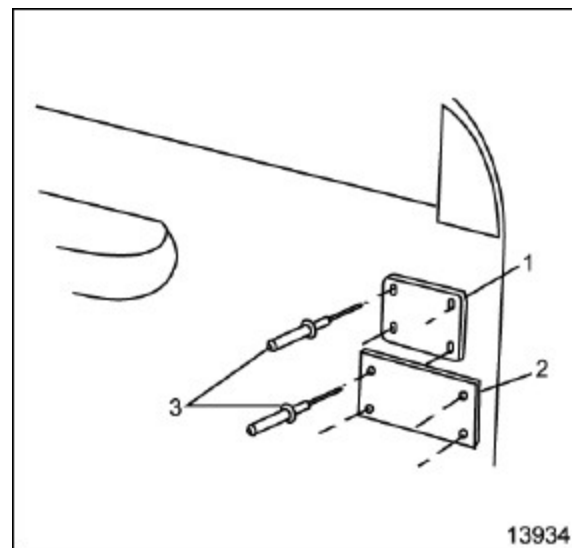
Tighten bolts to 8 N•m (6 lb ft).



Government Vehicle Data Plate Replacement

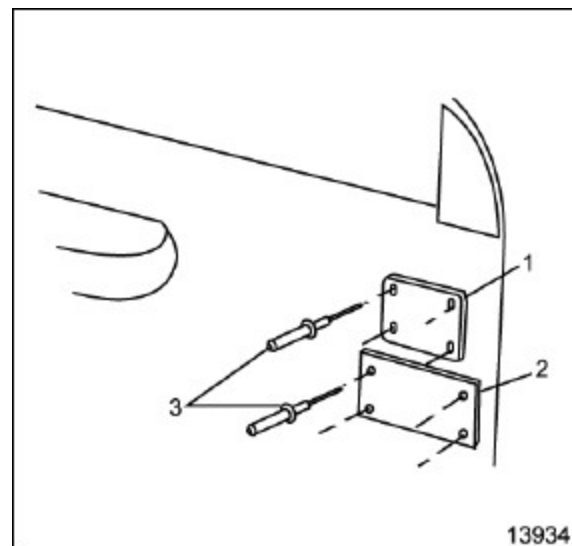
Removal Procedure

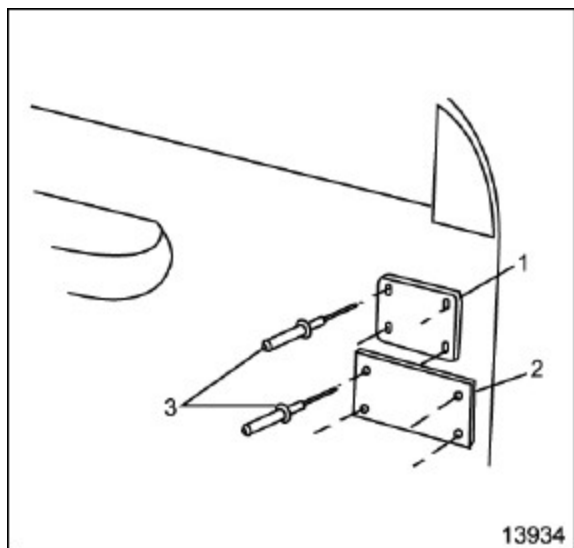
1. Drill out the four rivets (3).
2. Remove the data plate (1).



Installation Procedure

1. Install the plate (1) to the original holes.
2. Install the new rivets (3).

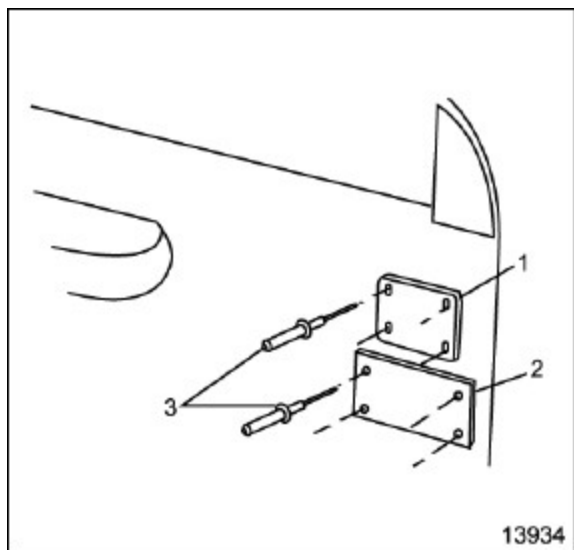




Shipping Data Plate Replacement

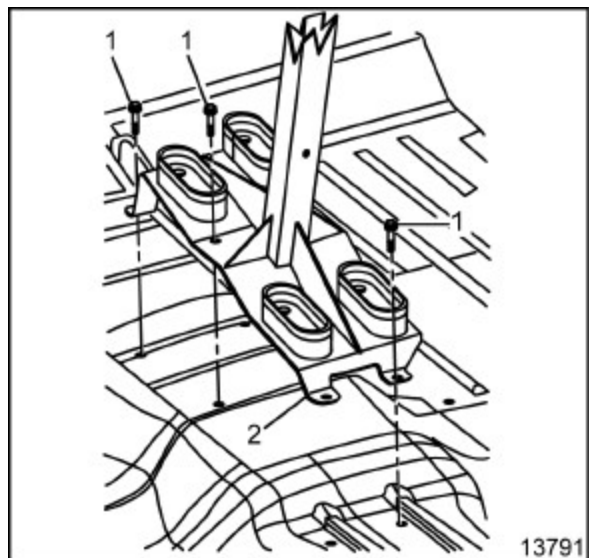
Removal Procedure

1. Drill out the 4 rivets (3).
2. Remove the data plate (2).



Installation Procedure

1. Install the data plate (2) to the original holes.
2. Install the new rivets (3).



Weapons Mount Replacement – Floor Mount

Removal Procedure

1. Remove bolts (1) securing weapons mount to the floor.
2. Remove weapons mount (2) from vehicle.

Installation Procedure

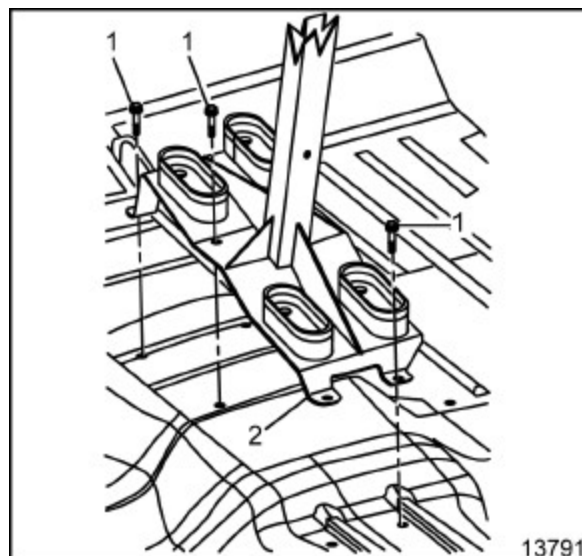
1. Install weapons mount (2) on floor aligning fastener holes.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install bolts (1) in the mount.

Tighten

Tighten bolts to 19-28 N•m (14-20 lb ft).

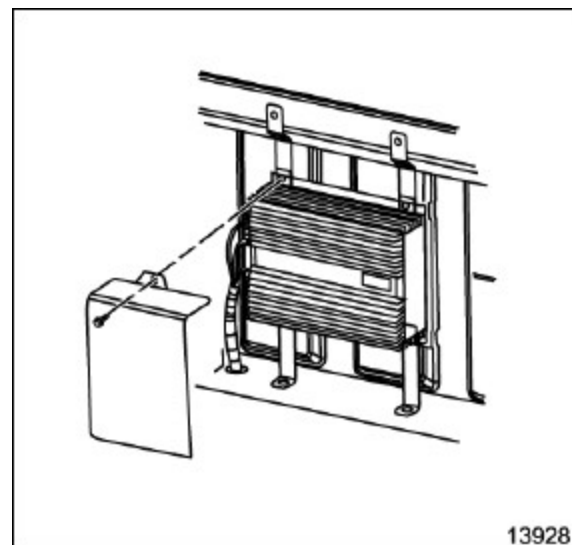


Battery Equalizer/Bracket Replacement

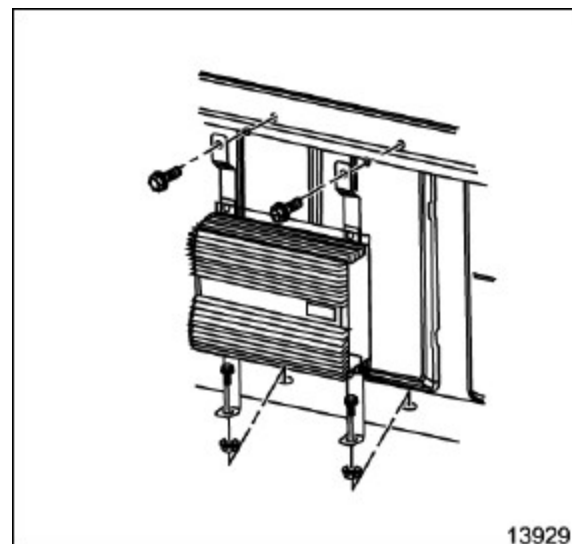
Removal Procedure

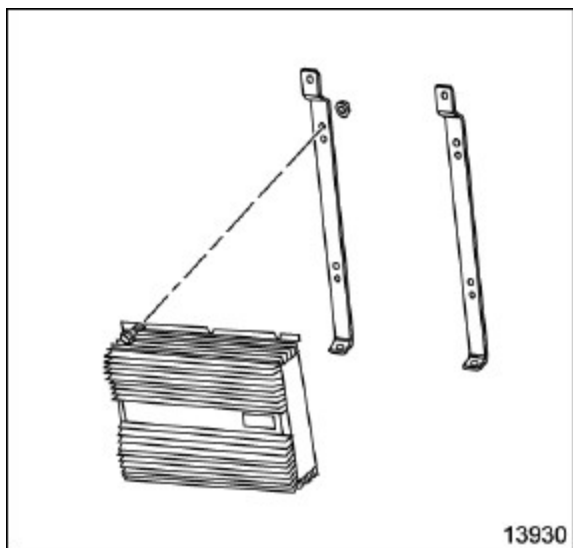
Caution: Refer to *Battery Disconnect Caution in Cautions and Notices*

1. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.
2. Remove the rear seat back. Refer to Seat Back Replacement - Rear.
3. Remove the equalizer cover from the mounting bracket.

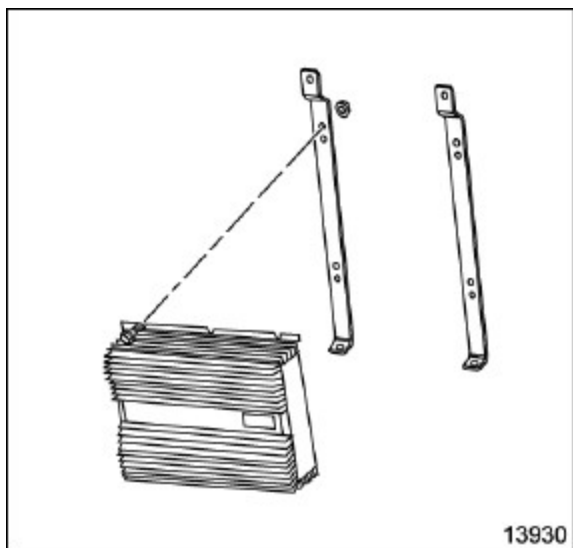


4. Remove the wiring harness connection from the equalizer. Note location of the wiring on the equalizer for reassembly.
5. Remove the left rear trim panel. Refer to Trim Panel Replacement - Rear Quarter Extended Cab or Trim Panel Replacement - Rear Quarter Crew Cab in Interior Trim in the C-31-Q44 -000/MN-001 Service Manual, Light Utility Vehicle Wheeled.
6. Remove the air outlet duct.
7. Remove the bolts securing the equalizer bracket to the rear cab wall.





8. Remove the equalizer assembly from the vehicle.
9. Remove the bolts securing the equalizer to brackets.

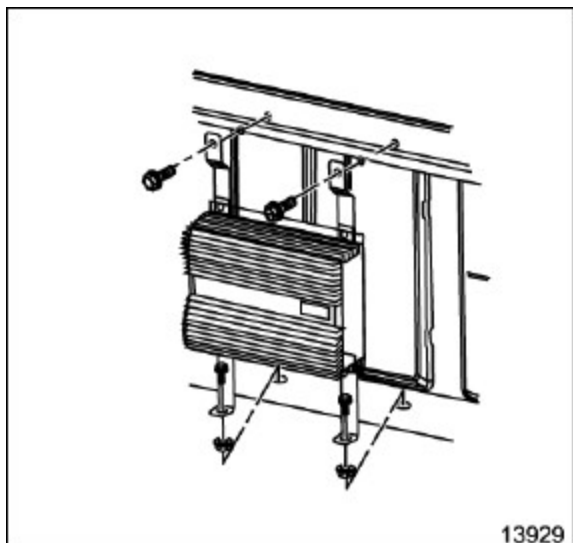


Installation Procedure

1. Install the brackets to the equalizer.

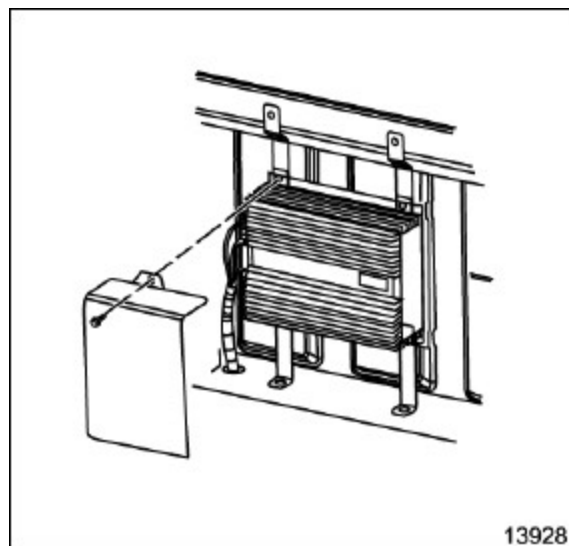
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bracket bolts.
Tighten
Tighten bracket bolts to 6-10 N•m (53-89 lb in).
3. Install the assembly into the vehicle.



4. Install the bolts securing the equalizer to the rear cab wall.
Tighten
Tighten the equalizer bolts to 6-10 N•m (53-89 lb in).
5. Install the air outlet duct.
6. Install the left rear trim panel. Refer to Trim Panel Replacement - Rear Quarter Extended Cab or Trim Panel Replacement - Rear Quarter Crew Cab in Interior Trim in the C-31-Q44-000/MN-001 Service Manual, Light Utility Vehicle Wheeled (LUVW).
7. Install the wiring harness connection to the equalizer in the same location as removed.
Tighten
Tighten the wiring connection to 12 N•m (110 lb in).

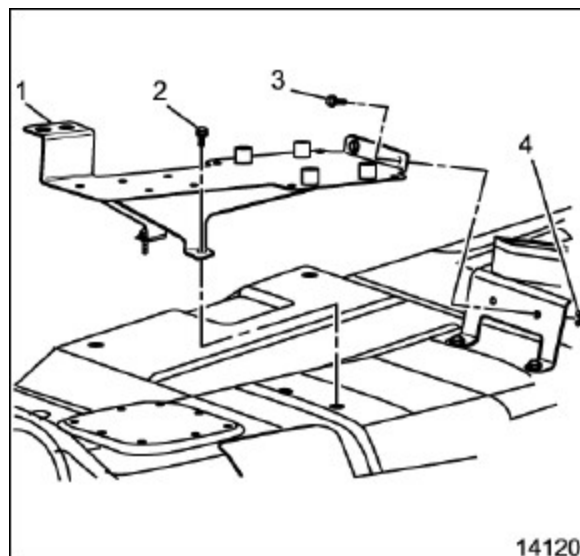
8. Install the equalizer cover.
9. Install the equalizer cover bolt.
Tighten
Tighten the cover bolts to 6-10 N•m (53-89 lb in).
10. Install the rear seat back. Refer to Seat Back Replacement – Rear.
11. Disconnect the battery cables. Refer to Battery Cable Disconnect/Connect Procedure in Engine Electrical.



GPS Mount Replacement

Removal Procedure

1. Remove the GPS from the bracket.
2. Remove the front bolts (2).
3. Remove the rear bolts (3) and nuts (4) from the weapons mount.
4. Remove the GPS bracket (1).

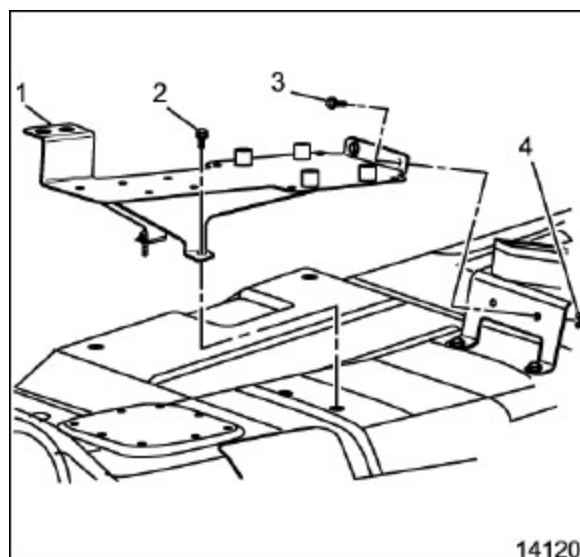


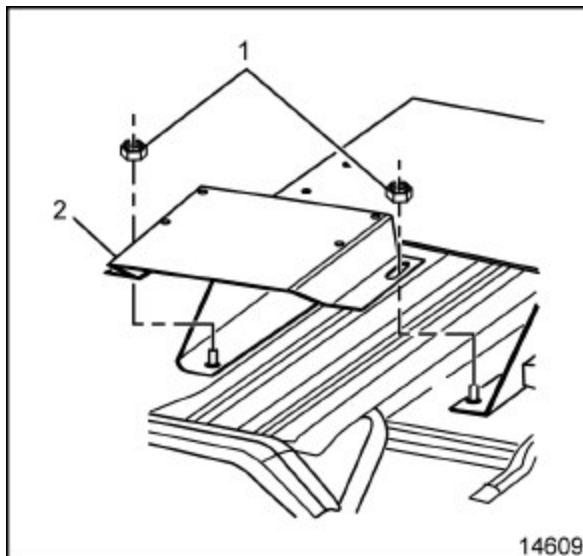
Installation Procedure

1. Install the GPS bracket (1) into the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the rear bolts (3) and nuts (4).
Tighten
Tighten rear bolts to 19-28 N•m (14-20 lb ft).
3. Install the front bolts (2).
Tighten
Tighten front bolts to 19-28 N•m (14-20 lb ft).
4. Install the GPS unit.

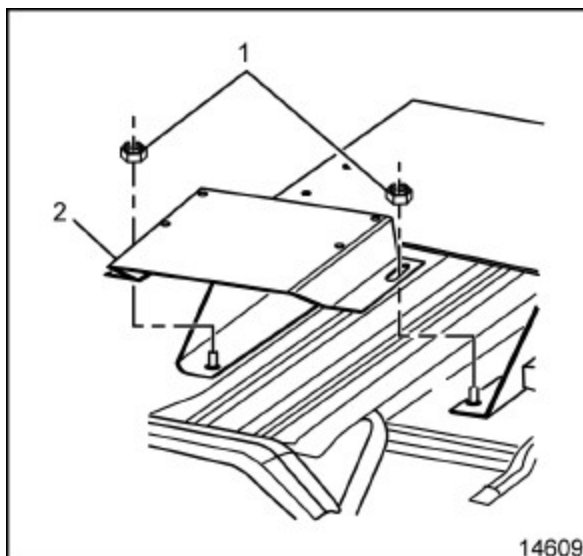




Accessory Bracket Replacement (Crew Cab)

Removal Procedure

1. Remove the nuts (1) securing the bracket to the floor.
2. Remove the accessory bracket (2) from the vehicle.
3. Remove any attaching items from the bracket.

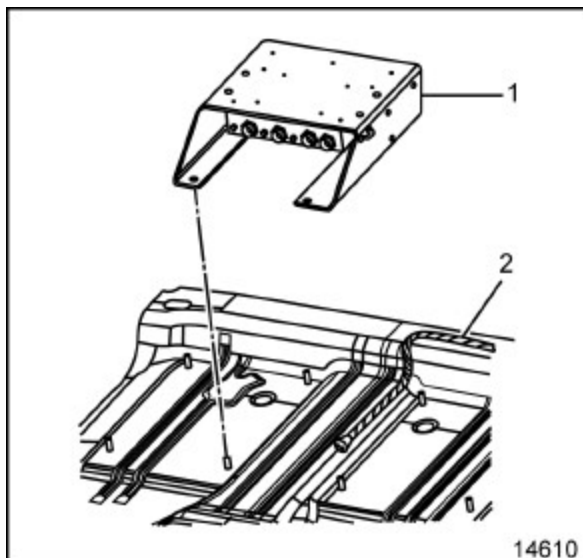


Installation Procedure

1. Install any attaching item onto the bracket.
2. Install the accessory bracket (2) into position in the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the nuts (1) securing the bracket to the vehicle.
Tighten
Tighten bracket nuts to 67-88 N•m (49-65 lb ft).



Radio Base Bracket Replacement

Removal Procedure

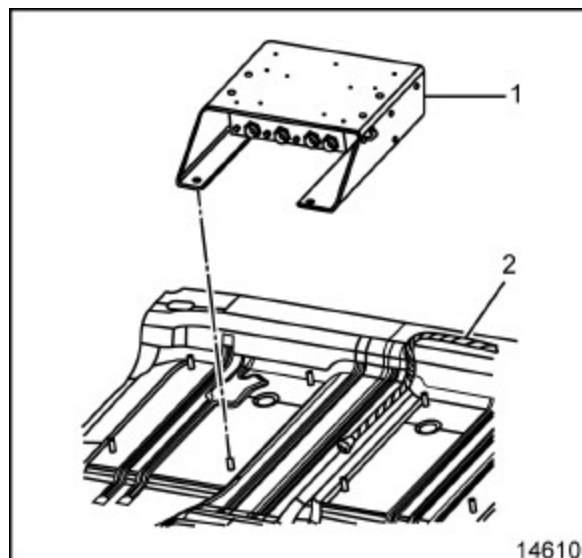
1. Remove the accessory bracket. Refer to Accessory Bracket Replacement (Crew Cab).
2. Remove both rear seat adapter brackets. Refer to Seat Adapter Bracket Replacement – Rear in Seats.
3. Disconnect the power distribution box cable (2).
4. Remove the two rear nuts securing the bracket to the vehicle.
5. Remove the bracket (1) from the vehicle.
6. Remove any attached, items from the bracket.

Installation Procedure

1. Install any removed items.
2. Install the bracket (1) into the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

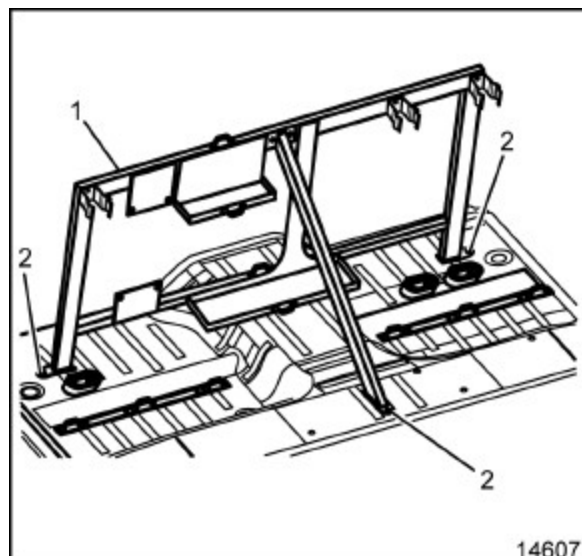
3. Install the 2 rear nuts securing the bracket to the vehicle.
Tighten
Tighten bracket nuts to 67-88 N•m (49-65 lb ft).
4. Connect the power distribution box cable (2).
5. Install both rear seat adapter brackets. Refer to Seat Adapter Bracket Replacement – Rear in Seats.
6. Install the accessory bracket. Refer to Accessory Bracket Replacement (Crew Cab).



Rear Storage Rack Replacement (Extended Cab)

Removal Procedure

1. Remove the bolts (1) securing the rack to the floor.
2. Remove the rack (2) from the vehicle.
3. Remove attaching items from the rack.

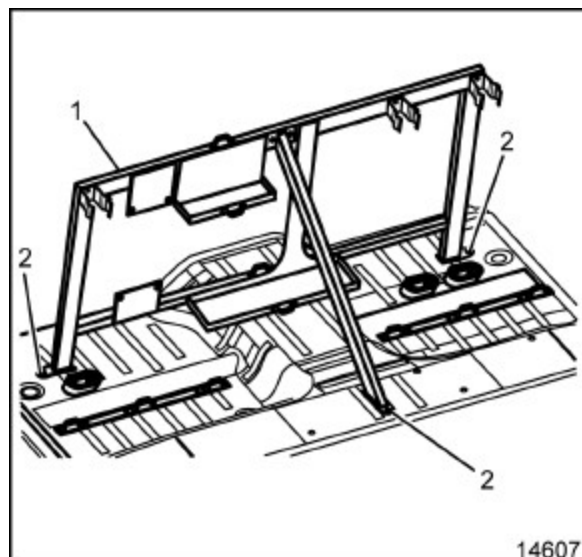


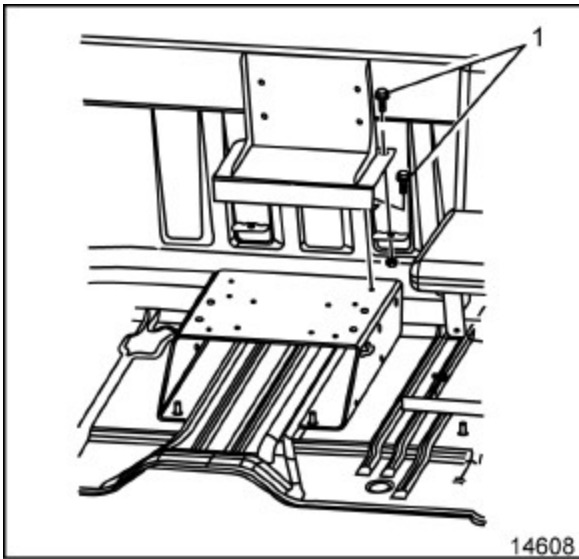
Installation Procedure

1. Install any attaching items removed.
2. Install the rack (2) into the vehicle.

Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install the bolts (1) securing the rack to the vehicle.
Tighten
Tighten rack bolts to 67-88 N•m (49-65 lb ft).

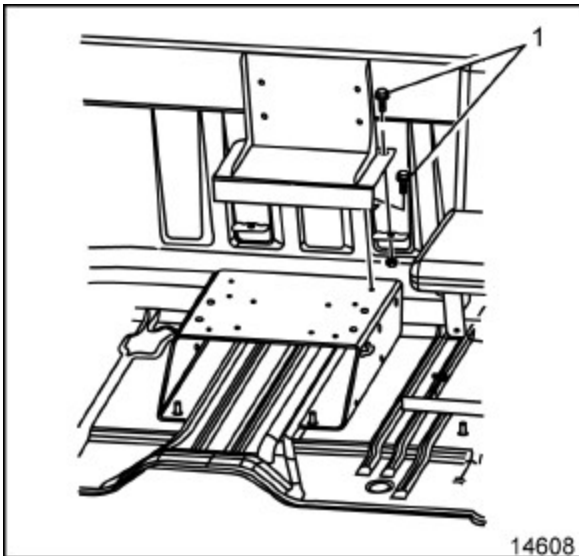




NAU Mount Replacement

Removal Procedure

1. Remove the bolts (1) from the right and left side securing the NAU mount to the radio base.
2. Remove the NAU bracket (2) from the vehicle.



Installation Procedure

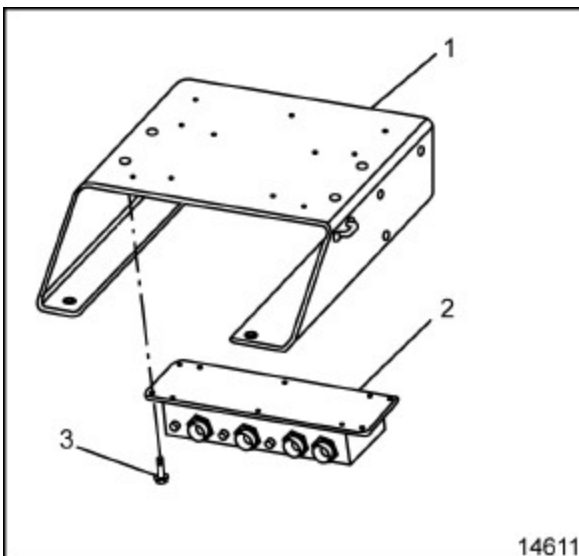
1. Install the NAU bracket (2) onto the radio base.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (1) on the right and left side securing the NAU mount to the radio base.

Tighten

Tighten NAU mount bolts to 19-28 N•m (14-20 lb ft).



Power Distribution Box (PDB) Replacement

Removal Procedure

1. Remove the radio base bracket (1). Refer to Radio Base Bracket Replacement.
2. Remove the bolts (3) securing the PDB to the radio base bracket.
3. Remove the PDB (2) from the radio base bracket.

Installation Procedure

1. Install the PDB (2) onto the radio base bracket with the connectors facing the front of the vehicle.

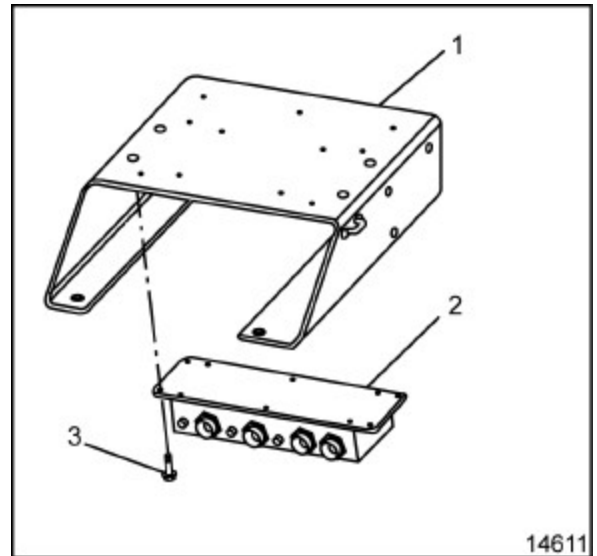
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (3) securing the PDB to the radio base (1).

Tighten

Tighten PDB bolts to 8-11 N•m (6-8 lb ft).

3. Install the radio base bracket into the vehicle. Refer to Radio Base Bracket Replacement.



Description and Operation

Interior Description

The interior trim options for these vehicles include special weapons supports various navigation/radio configurations and various storage items.

Refer to the C-31-Q44-000/MB-005 Operators Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW) for weapon mount operation and use.

Body Rear End

Specifications

Fastener Tightening Specifications

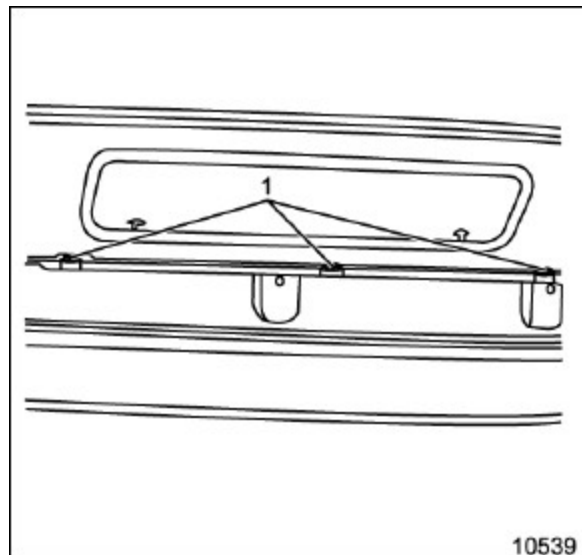
Application	Specification	
	Metric	English
Cargo Tie-Down Rail Bolts	18-23 N•m	13-17 lb ft
Fibreglass Top Bolts	30-40 N•m	22-30 lb ft
Naptha Can Mount Bolts	18-23 N•m	13-17 lb ft
Tire Chain Stowage Box Bolts	18-23 N•m	13-17 lb ft
Water/Fuel Can Mount Bolts	18-23 N•m	13-17 lb ft

Repair Instructions

Fibreglass Top Replacement

Removal Procedure

1. Remove electrical connection for the light.
2. Remove bolts (1) securing cap to bed rails.
3. With the aid of an assistant, remove the top from the vehicle.
4. Remove old foam tape from bed rails.



Installation Procedure

1. Install new foam tape to bed rails.
2. With the aid of an assistant, place the top on the bed rails.

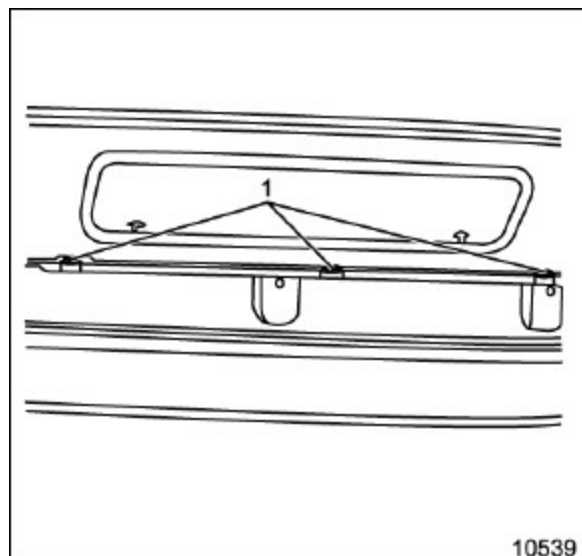
Notice: Refer to Fastener Notice in Cautions and Notices.

3. Install bolts (1) and tighten.

Tighten

Tighten bolts to 30-40 N•m (22-30 lb ft).

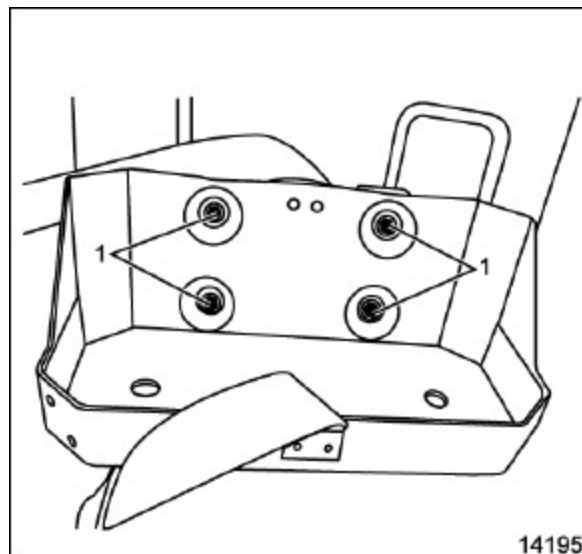
4. Connect electrical connection for the light.

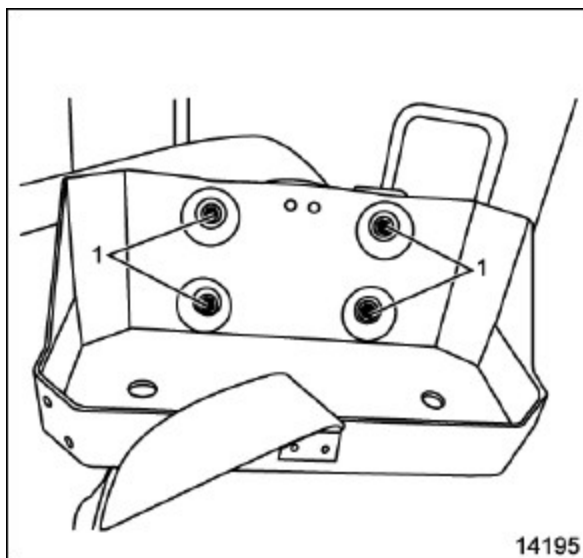


Water/Fuel Can Mount Replacement

Removal Procedure

1. Remove the water/fuel can from the mount.
2. Remove the bolts (1) and remove the mount.
3. Remove all straps from the mount.



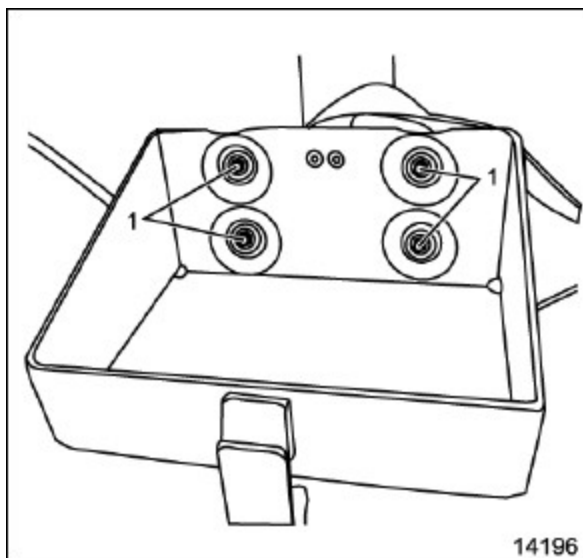


Installation Procedure

1. Install all straps removed from the old mount.

Notice: Refer to Fastener Notice in Cautions and Notices.

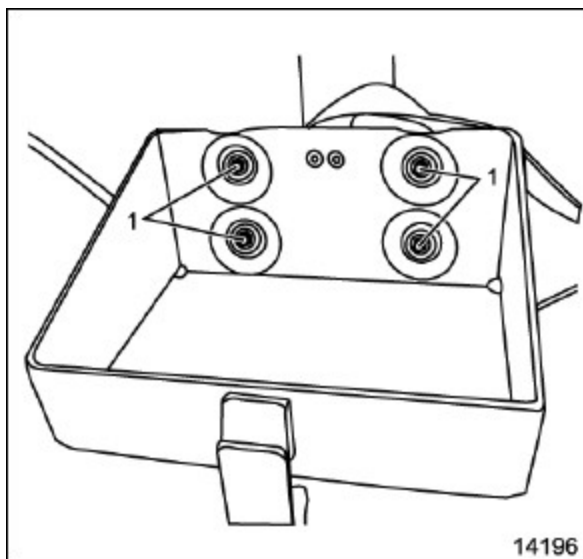
2. Install the mount onto the vehicle and install bolt (1).
Tighten
Tighten mount bolts to 18-23 N•m (13-17 lb ft).
3. Install the water/fuel can into the mount.



Naptha Can Mount Replacement

Removal Procedure

1. Remove the naptha can from the mount.
2. Remove the bolts (1) and remove the mount.
3. Remove all straps from the mount.



Installation Procedure

1. Install the straps removed from the old mount.

Notice: Refer to Fastener Notice in Cautions and Notices.

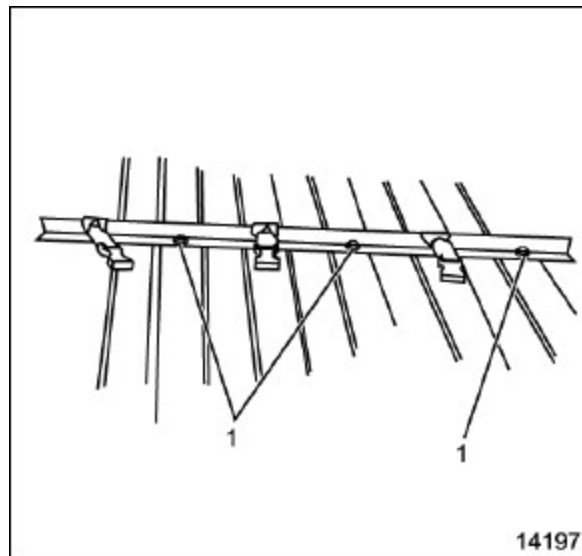
2. Install the mount onto the vehicle and install the bolts.
Tighten
Tighten the bolts to 18-23 N•m (13-17 lb ft).
3. Install the naptha can into the mount.

Cargo Tie-Down Rail Replacement

Note: This procedure covers the replacement of the upper or lower cargo tie-down rail.

Removal Procedure

1. Remove the 8 bolts (1) from the tie-down rail.
2. Remove the tie-down rail from the vehicle.
3. Remove all straps from the tie-down rail.



Installation Procedure

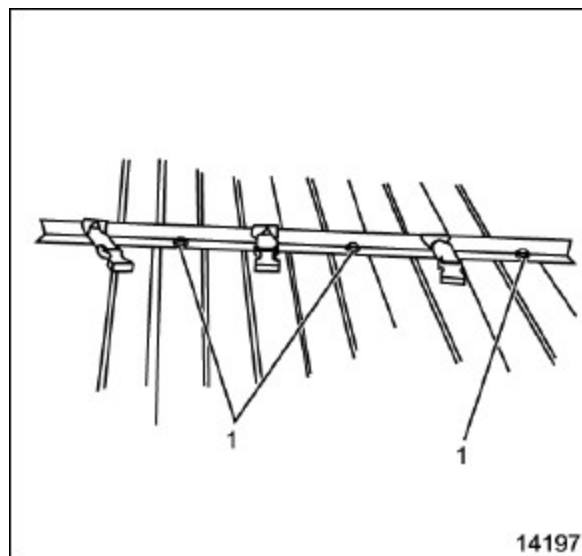
1. Install all straps removed from the tie-down rail.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the tie-down rail onto the vehicle and install the 8 bolts (1).

Tighten

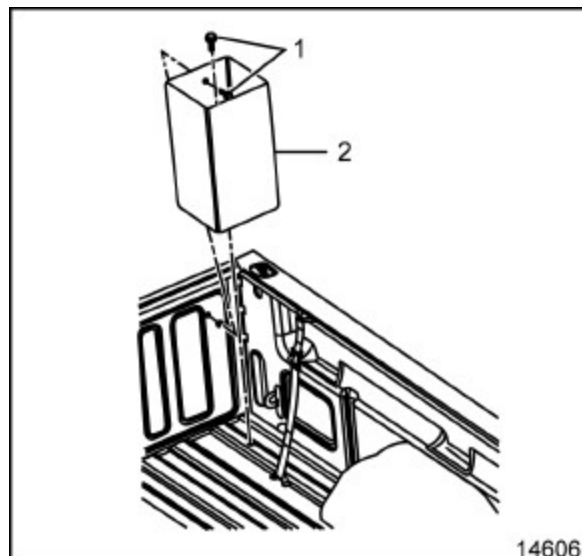
Tighten the bolts 18-23 N•m (13-17 lb ft).

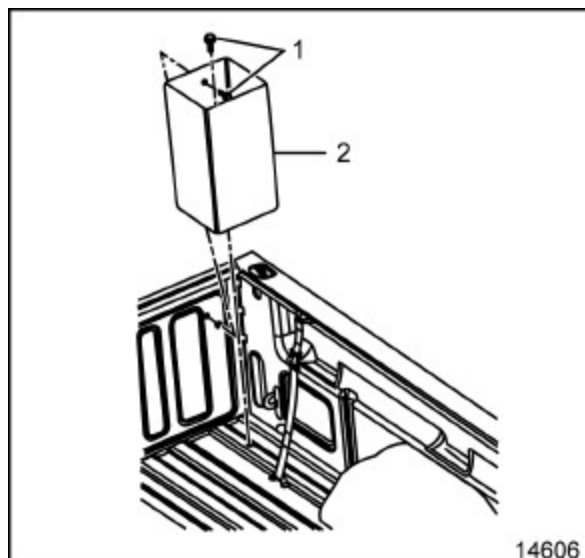


Tire Chain Storage Box Replacement

Removal Procedure

1. Remove bolts (1) from the side and bottom of the storage box.
2. Remove the storage box (2) from the cargo area.





Installation Procedure

1. Install the storage box (2) into the cargo area location.

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (1) to the side and bottom of the storage box.

Tighten

Tighten the storage box bolts 18-23 N•m (13-17 lb ft).

Description and Operation

Body Rear End

The features described here are exclusive to the pickup/cargo vehicle. The pickup vehicle is equipped with several military options including tie-down eyes and fibreglass top.

Fibreglass Top

The fibreglass top is a hard top cover supported by the bed rails and has back windows that are able to open and lock. The dome lamp can be manually turned OFF and ON by switches mounted in the blackout (B/O) switch panel and the left rear of the pickup. Refer to C-31-Q44-000/MB-005 Operators Instructions Military Supplement, Light Utility Vehicle Wheeled (LUVW).

Rear Storage

Crew Cab

The rear storage consist of the following:

- Fuel can mount
- Water can mount
- Naptha can mount
- Tire chain mount
- Cargo tie-down rails.

For item location and storage refer to C-31-Q44-000/MB-005 Operator's Instructions Military Supplement Light Utility Vehicle Wheeled (LUVW).

Paint/Coatings

Paint Codes

Exterior and Interior Colours

Location/Colour	Fed.-std.-595 B	PPG No.
Camouflage Green	34094	CA 8211 / 1 5086

For specific paint/coating details, contact PPG Automotive Coatings at 1-818-549-7772.

Repair Instructions

Exterior Painting

Metal Refinishing

1. Remove all exterior ornament and emblems from the panel to be painted.
2. Prepare all metal surfaces to be painted.

Note: Cut paint at door seals, remove or mask over door seals.

3. Repaint all exterior metal with lustreless camouflage green paint. Refer to Exterior and Interior Colours Chart for current paint part number.

Important: This is not CARC paint, the recommended supplier is PPG.

4. Remove masking tape.

Notice: Exercise care when removing masking and handling vehicle after repainting, to avoid marks and dirt on the new paint. It is very difficult to clean up without leaving noticeable damage.

Grille Refinishing

Procedure

Note: Ensure that all chrome areas have 100% coverage.

1. Using a coarse refinishing material, scuff the surface of the grille.
2. Using etching primer, prepare the surface of the grille for the finish coat.
3. Repaint all exterior metal with lustreless camouflage green paint. Refer to Exterior and Interior Colours Chart for current paint part number.

Important: This is not CARC paint, the recommended supplier is PPG.

Frame and Underbody

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
ABS Shield Bolts	40 N•m	30 lb ft
Centre Support Beam Bolts (Pass Through)	60-68 N•m	44-50 lb ft
Centre Support Beam Bolts (Threaded Hole)	40-47 N•m	30-35 lb ft
Front Skid Plate Bolts (Front)	20-22 N•m	15-16 lb ft
Front Skid Plate Bolts (Rear)	30-40 N•m	22-30 lb ft
Rear Skid Plate Bolts	30-40 N•m	22-30 lb ft
Rear Support Beam Bolts	60-68 N•m	44-50 lb ft
Skid Plate Support Beacon Bolts	60-68 N•m	44-50 lb ft
Support Beam Bolts (Skid Plate)	30-40 N•m	22-30 lb ft

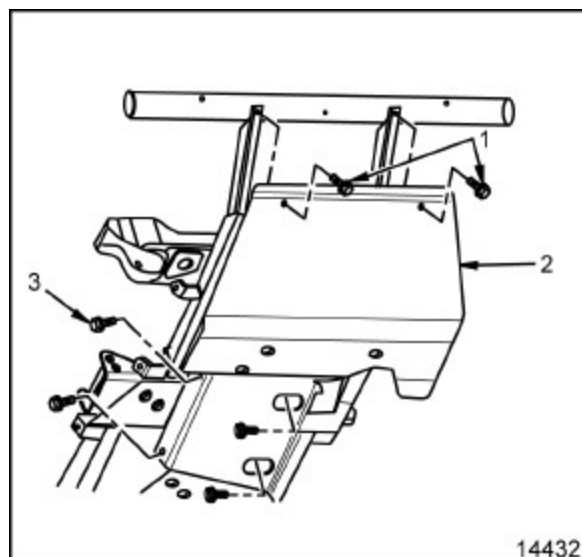
Repair Instructions

Front Skid Plate Replacement

Removal Procedure

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Remove the bolts (1) from the front of the skid plate.
3. Remove the bolts (3) from the side of the skid plate.
4. Remove the skid plate (2) from the vehicle.

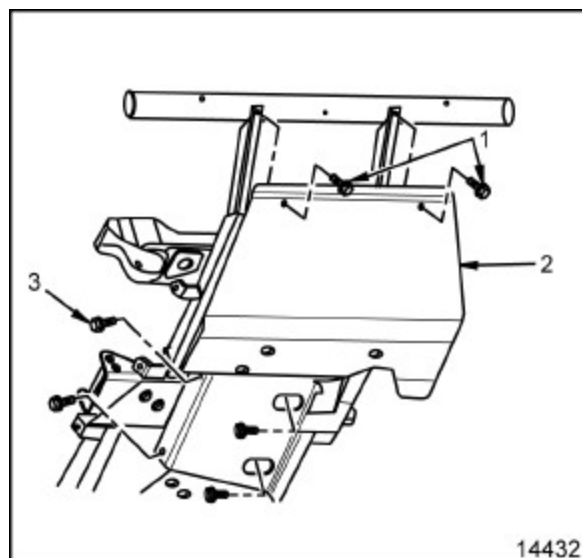


Installation Procedure

1. Install the skid plate to the vehicle.

Notice: Refer to *Fastener Notice in Cautions and Notices*.

2. Install the side bolts (3).
Tighten
Tighten the bolts to 30-40 N•m (22-30 lb ft).
3. Install the front bolts (1).
Tighten
Tighten the bolts to 20-22 N•m (15-16 lb ft).
4. Remove the safety stands.
5. Lower the vehicle.

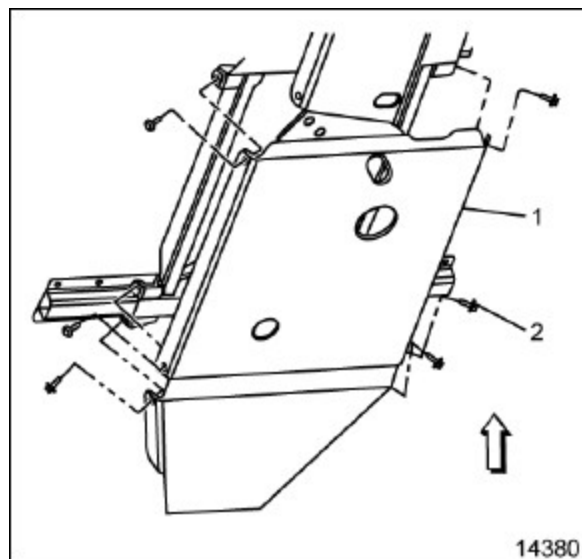


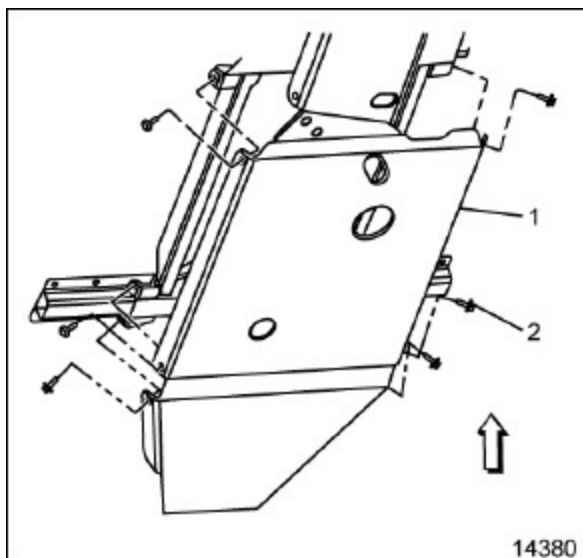
Rear Skid Plate Replacement

Removal Procedure

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Support the skid plate and remove the bolts (2).
3. Remove the support and remove the skid plate (1).





Installation Procedure

1. Install the skid plate (1) and support.

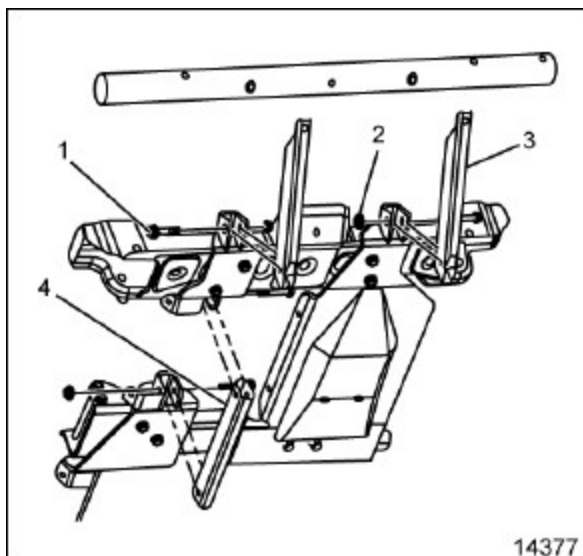
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (2) and remove support.

Tighten

Tighten bolts to 30-40 N•m (22-30 lb ft).

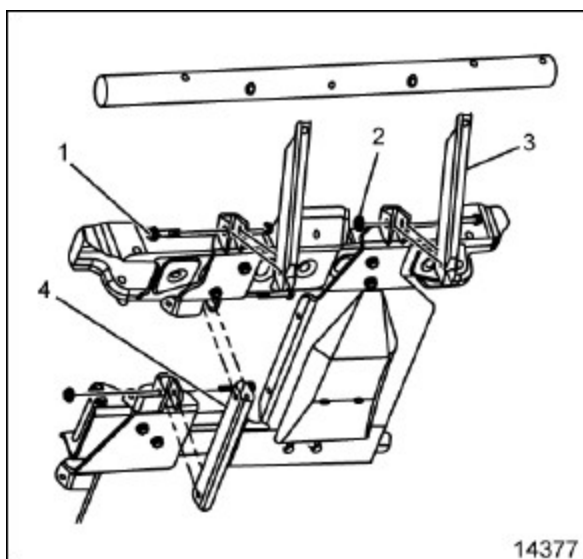
3. Remove the safety stands.
4. Lower the vehicle.



Front Support Beam Replacement (Skid Plate)

Removal Procedure

1. Remove the front skid plate. Refer to Front Skid Plate Replacement.
2. Remove the bolts (1) and nuts (2).
3. Remove the support beam (3) and (4).



Installation Procedure

1. Install the support beam (3) and (4).

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (1) and nuts (2).

Tighten

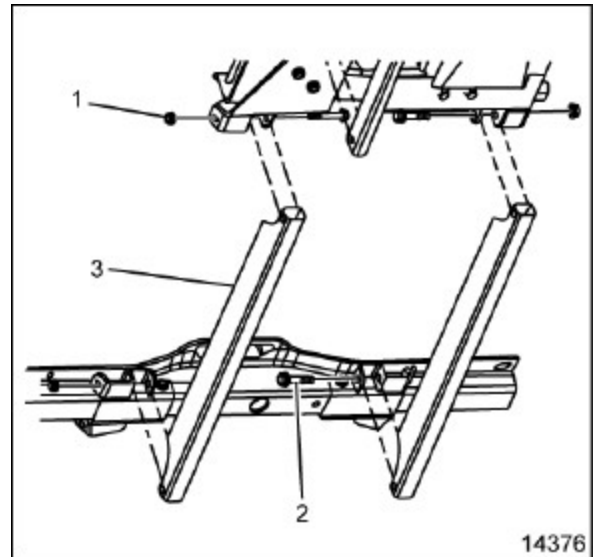
Tighten nuts and bolts to 30-40 N•m (22-30 lb ft).

3. Install the front skid plate. Refer to Front Skid Plate Replacement.

Rear Support Beam Replacement (Skid Plate)

Removal Procedure

1. Remove the rear skid plate. Refer to Rear Skid Plate Replacement.
2. Remove the nuts (1) and bolts (2).
3. Remove the support beams (3).



Installation Procedure

1. Install the support beams (3).

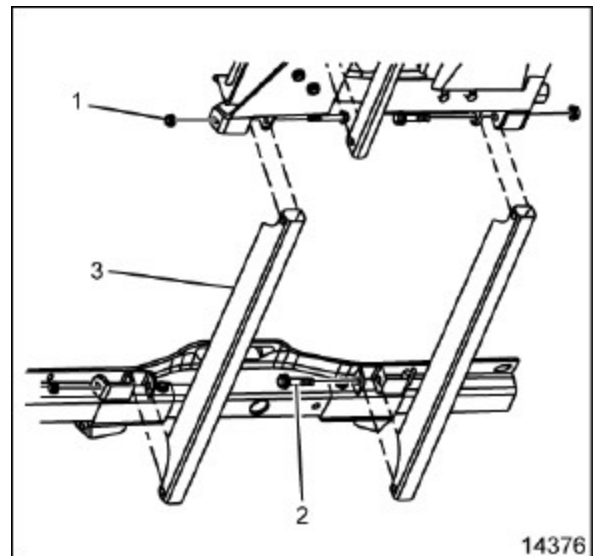
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (2) and nuts (1).

Tighten

Tighten nuts and bolts to 30-40 N•m (22-30 lb ft).

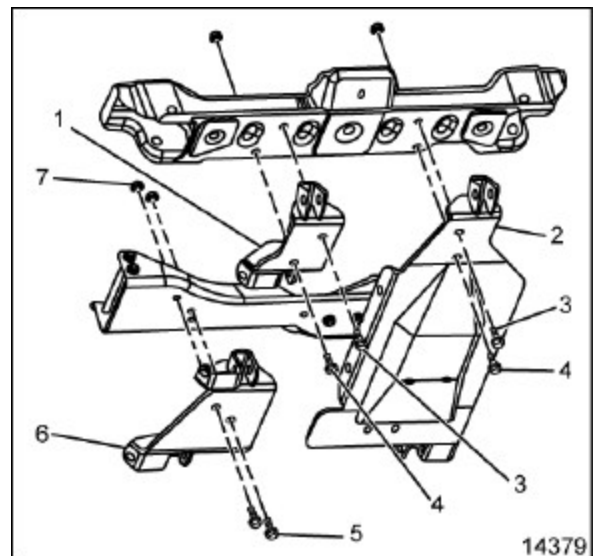
3. Install the rear skid plate. Refer to Rear Skid Plate Replacement.

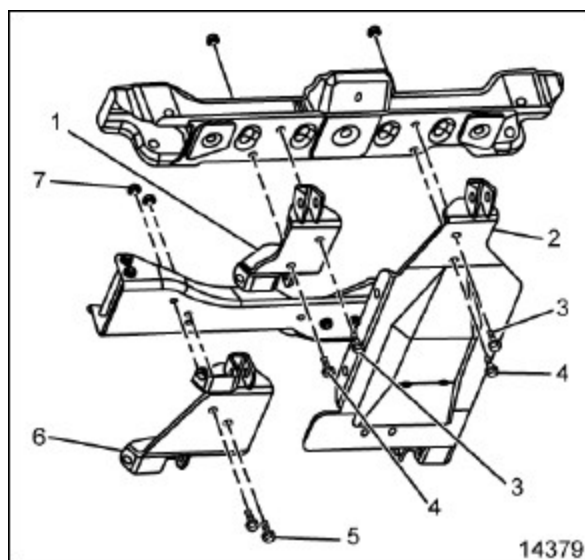


Centre Frame Bracket Replacement (Skid Plate)

Removal Procedure

1. Remove the front skid plate. Refer to Front Skid Plate Replacement.
2. Remove the rear skid plate. Refer to Rear Skid Plate Replacement.
3. Remove the rear support beams. Refer to Rear Support Beam Replacement (Skid Plate).
4. Remove the front support beams. Refer to Front Support Beam Replacement (Skid Plate).
5. Remove the nuts (7) and bolts (3, 4) and (5) securing the brackets to the crossmembers.
6. Remove the brackets (1, 2) and (6) from the vehicle.





Installation Procedure

1. Install the brackets (1, 2) and (6) on the vehicle.

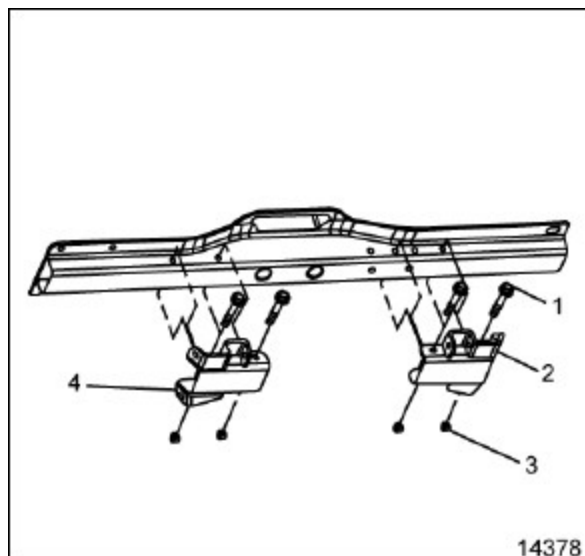
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (3, 4) and (5) and nuts (1).

Tighten

- Tighten bolts (4, 5) to 60-68 N•m (44-50 lb ft).
- Tighten bolts (3) to 40-47 N•m (30-35 lb ft).

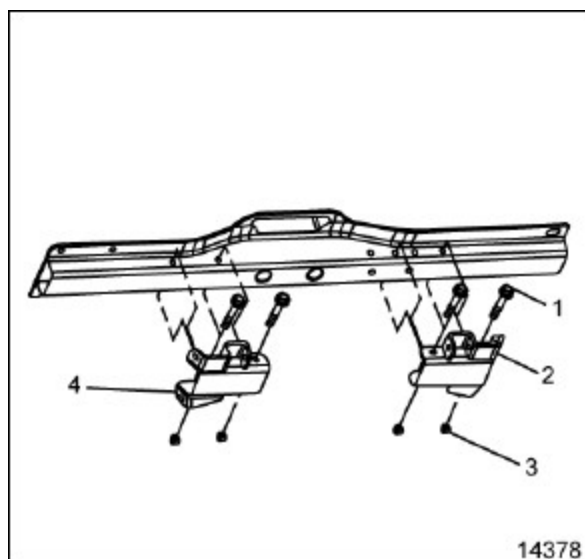
3. Install the front support beams. Refer to Front Support Beam Replacement (Skid Plate).
4. Install the rear support beams. Refer to Rear Support Beam Replacement (Skid Plate).
5. Install the rear skid plate. Refer to Rear Skid Plate Replacement.
6. Install the front skid plate. Refer to Front Skid Plate Replacement.



Rear Frame Bracket Replacement (Skid Plate)

Removal Procedure

1. Remove the rear skid plate. Refer to Rear Skid Plate Replacement.
2. Remove the rear support beams. Refer to Rear Support Beam Replacement (Skid Plate).
3. Remove the nuts (3) and bolts (1).
4. Remove the rear mounts (2) and (4).



Installation Procedure

1. Install the rear mounts (2) and (4).

Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts (1) and nuts (3).

Tighten

Tighten nuts and bolts to 60-68 N•m (44-50 lb ft).

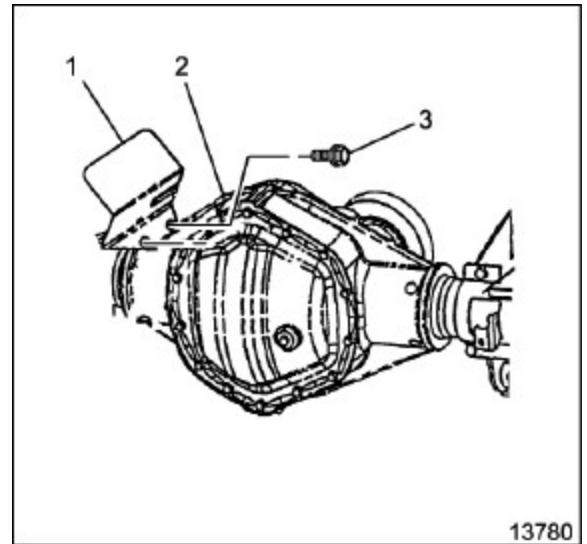
3. Install the rear support beams. Refer to Rear Support Beam Replacement (Skid Plate).
4. Install the rear skid plate. Refer to Rear Skid Plate Replacement.

ABS Shield Replacement

Removal Procedure

Caution: Refer to *Vehicle Lifting Caution in Cautions and Notices*.

1. Raise and support the vehicle.
2. Remove the 2 bolts (3) securing the ABS shield (1) to the rear axle housing cover (2).
3. Remove the ABS shield (1) from the rear axle housing cover (2).



Installation Procedure

1. Position the ABS shield (1) onto the rear axle housing cover (2).

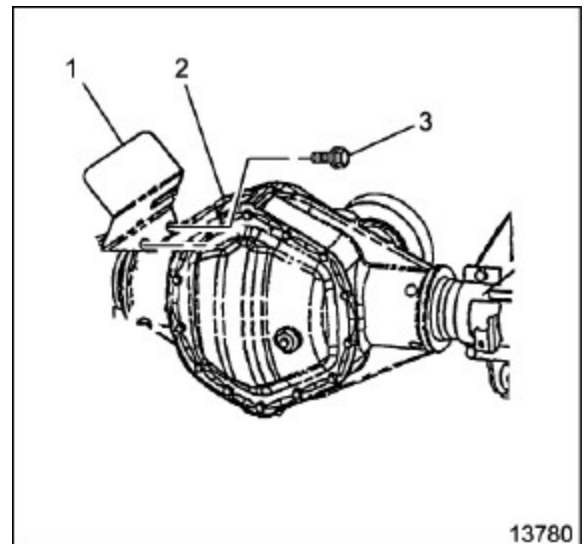
Notice: Refer to Fastener Notice in Cautions and Notices.

2. Install the 2 bolts (3) onto the ABS shield (1) and the rear axle housing covers (2).

Tighten

Tighten the ABS shield to rear axle housing cover bolts to 40 N•m (30 lb ft).

3. Remove supports and lower the vehicle.



Description and Operation

Frame and Underbody Description

Underbody Protection

The underbody protection covers are mounted to the frame. In off-road conditions these covers will protect the enclosed components from damage.

The covers do not affect the operation of the vehicle.

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